MAY 1958

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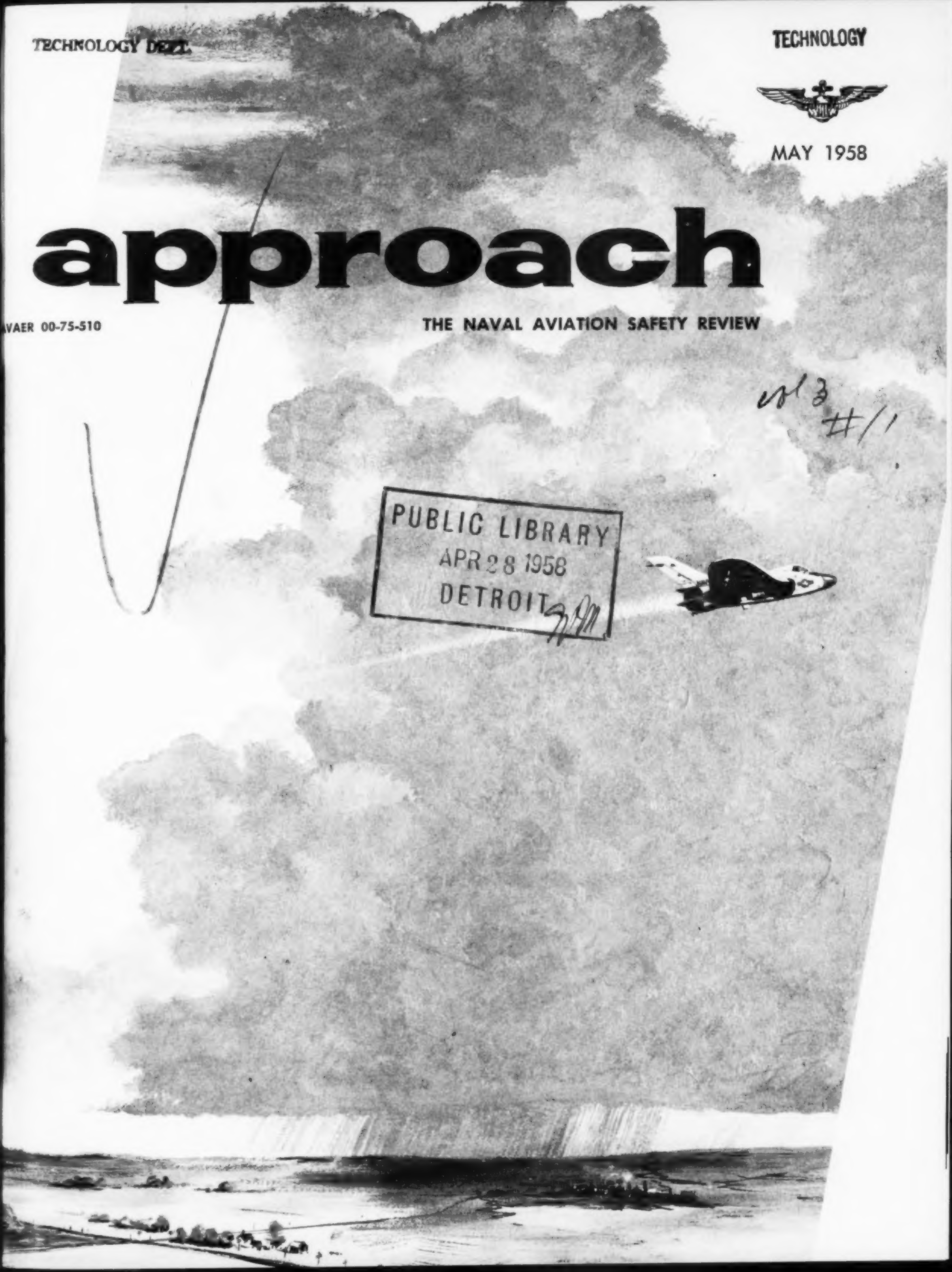
THE NAVAL AVIATION SAFETY REVIEW

vol 3 #11



Vol. 3 May 1958 **No. 11**

IN THIS ISSUE

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Purposes and Policies: This periodical contains the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders, or directives unless so stated. Material extracted from Aircraft Accident Reports, (OpNav 3750-1), Aircraft FLIGA Report (3750-10), and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, UCMJ. Names used in accident stories are ficticious unless stated otherwise. Photos: Official Navy or as otherwise credited.

To assure use of the latest available information, Non-naval activities are requested to contact NASC prior to reprinting APPROACH material.

Correspondence: Contributions are welcome as are comments and criticisms. Address correspondence to U. S. Naval Aviation Safety Center, NAS Norfolk 11, Va. No payment can be made for manuscripts submitted for publication. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Views expressed in guest written articles are not necessarily those of the Naval Aviation Safety Center.

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LETTERS

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.

No Trespassing

Sir:

Too frequently I receive complaints from our aircrews of U. S. Navy aircraft flying through R47, Ship Shoal Island, Va. On several occasions during the past few months, I have personally observed Navy aircraft flying through this restricted area.

Perhaps the gentlemen who knowingly or unknowingly do this fail to realize that they are courting danger. During VFR weather, this unit conducts extensive high altitude bombing utilizing the Ship Shoal bombing range. During the last 50 miles of the bomb run, the pilot is strictly on instruments and does not clear himself visually. Also, 250 lb M124 practice bombs are being dropped. The possibility always exists that an aircraft

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wandering through this area during bombing operations, could be struck by a bomb or an aircraft. For this reason, this area is designated as a restricted area and is listed as such in all applicable publications.

The purpose of this letter is not to grind an ax but to point out that seemingly, some of your gents don't have the poop about R47, Ship Shoal Island, Virginia. So, in the interest of your Flying Safety and ours, I'm passing this along to you for whatever it's worth.

VINCENT H LA FETRA

Capt., Flt. Saf. Officer
Langley AFB. Va.

Safety Wire

Sir:

After reading two of the letters received by you, in February's issue, entitled "Safety? Wire" and "Safety Wire vs Breakaway Wire" I am very much surprised to hear that this needless situation still exists in naval aviation.

Why should a pilot have to carry tools with him? Is he a mechanic?

What is there in a name, after a man realizes that his ejection seat or canopy safety devices have been locked with stainless steel wire? Do we care whether it is called "Safety Wire" or "Breakaway Wire"?

Seems to me that the difficulty can be remedied by outlawing the use of aluminum wire on ejection mechanisms. A man doesn't have to be a metallurgist to distinguish between copper and steel, but the similar appearance of aluminum and steel tends to confuse. Don't you agree?

M. W. HOBART, AM1
NAMTD, NAATC Memphis

—Watch for a Safetywire article in APPROACH *soon.—Ed.*

CORRECTION—The March issue of APPROACH carried a letter by Mr. K. E. Dentel ("Use of P2V Varicam") containing the statement, ". . . therefore heavy use of the varicam was necessary." Approach apologizes for its error in transcribing; the sentence should have read, ". . . was unnecessary."—Ed.

Frequency Shifting

Sir:

"This note is not to tell of any 'hairy' tale but is rather to bring to your attention an instrument approach procedure which elminates the adverse condition of 'Shifting of Frequency'.

"It has been in effect at NAS Atlantic City for the past 18 months, and we have yet to have the first aircraft make a 'lost communications' approach or the first pilot to crawl out of an airplane after an approach and complain.

"The equipment involved is that of a standard outdated Air Search Radar, good long range radio communication equipment and one CPN-4 GCA trailer.

"When ARTC gives approach control the expected traffic, Radar starts its search in the vicinity of that particular fix to avoid delay. When the aircraft makes his initial call he is given the weather, any known traffic, an approach time and an assigned Radar approach frequency, and if applicable he is also given an IFF mode for faster detection.

"After this one frequency change, no matter what his position, he remains on it until he is safely on the deck. Initial Radar contact with the aircraft is a radio check, then he is given his radar position in relation to Atlantic City. While inbound to the fix and under radar observation, but prior to commencing a letdown, GCA will radio check the aircraft and issue lost communications procedure on the same frequency.

"The complete approach is radar controlled and the pilot can concentrate on flying his airplane while the radar controller does his navigation. The hazard of frequency change at a low altitude is eliminated and target identification turns are eliminated by the search radar coaching on GCA by position reports every mile, five miles in front of the GCA gate or hand-off position.

"The relaxing point for the pilot is when GCA assumes control with this transmission, 'Navy jet 12345, Atlantic City GCA, I assume control your radar position, South east of Navy Atlantic, 16 miles."

"FOUR FRIENDS"
NAS Atlantic City

Very interesting. Believe this is done at a few other places, CAA, equipment and traffic permitting. Any radar comment?—Ed.

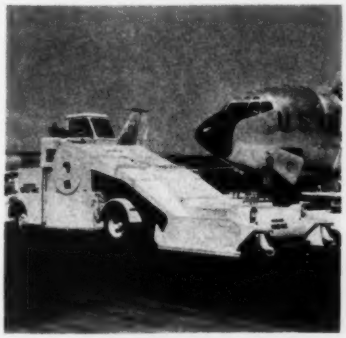
Foreign Object Damage

Sir:

. . . Request this squadron be furnished with two copies of Aircraft Gas Turbine Engine Foreign Object Damage Protection Information Pamphlet of November 1957. Any other information on this subject would be greatly appreciated.

William J. DE BUS
Maintenance Officer
VMA-121, MAG-15
MCAS, El Toro

Pamplets are on the way. Also see APPROACH *articles Jet Engine Enemy No. 1, Feb '56; Jetsam, March '57; Are We to Live With It?, Dec 57. BuAer has recently purchased vacuum cleaners for Jet house-keeping—Cole-Vac model for runways, pictured here, cleans 1 million square feet per hour—for confined areas the Tennant model 100 has short turning radius.—Ed.*



MOR Proof

Sir:

Hats off to your staff writer responsible for "E is for Eating—Efficiency" in the February APPROACH. His light approach was the right approach to impress aviation personnel with the seriousness of the under/over eating problem. Your writer served up generous helpings of food for thought.

Any doubting Thomases who question the fact that proper nourishment in proper amounts at proper intervals is conducive to longevity in this aviation age need only to peruse any random

Continued from preceding page

pile of MOR's for proof positive that the care and feeding of pilots is involved to a high degree in current aircraft accidents.

Your February issue, in common with all the preceding issues of your excellent magazine, is chock-full of well presented, pertinent poop.

W. E. JOHNSTON, CDR
Aviation Safety Division
DCNO (Air)

'Thang' Proves Its Worth

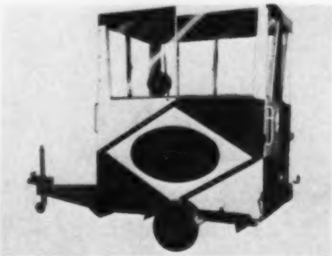
Sir:

Recently when the Sherman Field Control Tower, NAS, Pensacola, experienced a complete communication failure, ATU-206's mobile control tower, dubbed the "THANG," assumed complete control of all aircraft operations at the field. Designed as an additional safety factor in the training of student pilots at ATU 206, the "THANG" is equipped with all the necessary radio gear to take over control of any NAS in case of an emergency such as this.

Lt. William H. PIERCE, the operator of the ATU-206 mobile tower, with the aid of an air controlman sent by the tower, continued normal operation at Sherman Field from 0645 until 0840, handling over 50 aircraft without a discrepancy.

With ATU-206's "THANG" in use daily, it is an improbability that Sherman Field will ever have to stop operating because of communications failure.

R. J. CALLAHAN, LCDR



Commercial model mobile runway control unit is also being evaluated by BuAer.—Ed.

Sea Squatter Quals

Sir:

In the November issue of APPROACH you mentioned the Sea Squatters' Club; would you tell me what the qualifications are, and how I can join?

J. McGARVEY, LCDR
NAS Denver

Gladly—the Sea Squatters is an informal, unofficial club sponsored by a manufacturer of life-saving equipment. Anyone who has been forced down at sea and had to use an inflatable raft or Mae West is eligible. Write to Walter Kidde & Co., 675 Main Street, Belleville 9, N. J. and tell them where, when, how long, type equipment and any related interesting facts; no official verification is required by Kidde, but check with the boss if you're in doubt about classified info. There are no dues, no meetings, but your membership card entitles you to swap hairy tales and drinks with other members.—Ed.

Instrument Proficiency

Your article in the February issue of APPROACH titled "Have White Card" was very interesting and contained lots of sage advice for naval aviators who must also pilot the all too common "LSD."

Could you tolerate a few comments from a proficiency pilot who has an instrument card and wants to keep it.

Flight planning means completing an inflight navigational log form, not just a DD 175, for the route hoped for but also for all likely departure routes. I too have been crossed up at the head of the runway by a new departure route so I engaged my brain and decided that it would be much easier to cross out three departure routes on the log than to fill in the *ONE* that I needed. Additional time required when in the flight planning room: three or four minutes.

After reading the memorandum in the January issue of Naval Aviation News on proficiency flying, I would be more inclined to say that maybe pilots don't use the flying time they get wisely rather than plenty of pilots don't get enough flying. We proficiency pilots don't like 100 hours a year but with a little planning and effort it can be made rather interesting and also a reasonable instrument proficiency maintained. One hour a month reading the books and an occasional link hop will do much to oil the grey matter that is needed when the weather is below VFR. A "Charley" pattern once a month will do much to coordinate the mind and muscles too—time required 16 minutes.

As a matter of curiosity since you allude to the approach plates being used by the Navy, did you ever try to find out what the weather minimums are for various fields to be used as an alternate airfield now that the Nav kit doesn't contain the H. O. 510 or the CAA Flight Information Manual, or do you use the destination minimums too?

PROFICIENCY PILOT
(LSD and SNB type)

There are more airports having CAA-approved letdowns than appear in the Pilot's Handbook, though there are roughly 1200 included. Hydro is aware of this—but if all the letdown plates (plus VFR airports) were listed in the present format, you would need a larger lap or Nav kit. The present handbooks are a compromise resulting in an overall choice of airports that is adequate for most military needs. If you have specific recommendations—such as inclusion of a particular letdown—write an official letter to Hydro. Charts have been added when sufficient justification existed. —Ed.

Sniffle Valve vs Check Valve

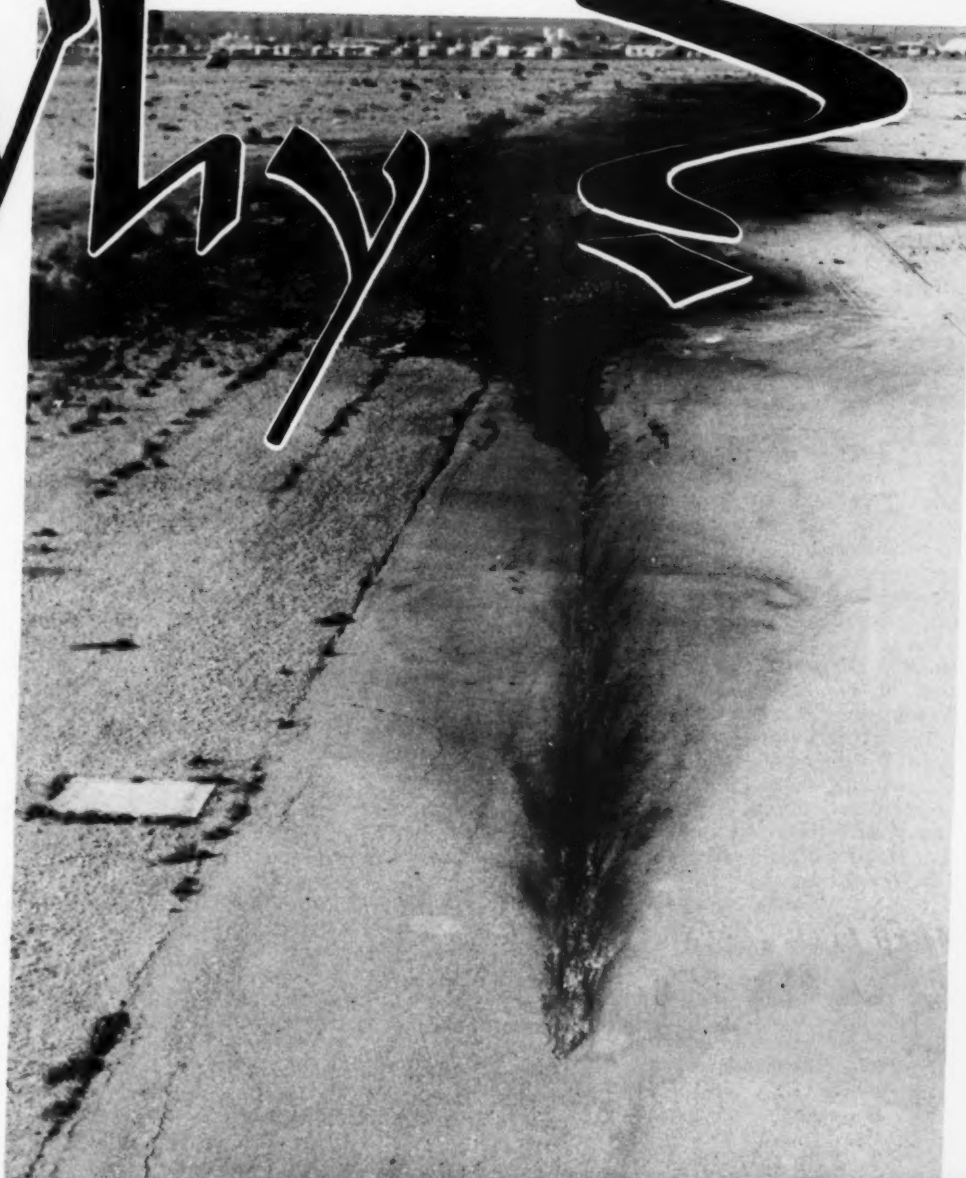
Sir:

"Cockpit Air Contamination," (Jan '58), uses the term "sniffle valve" to refer to that one-way check valve whose purpose is to prevent air flow back toward the pressure source (engine) in an air pressure operated fuel pumping system or fuel pressurization system. These are not "sniffle valves" but are less romantically referred to as *one-way check valves.* A "sniffle valve" is another one-way check valve whose purpose is to vent outside atmospheric air into a tank whose internal pressure has become less than atmospheric—to prevent collapsing the tank; occasioned, perhaps, by a rapid descent to lower altitudes.

Felix J. JABLONSKI, LCDR
HATU, Sanford, Florida

APPROACH *erred—this should have read " . . . cockpit contamination can result from the malfunction of a single check valve [and/or] the sniffle valve . . . "—Ed.*

Why?



No one knows whether the pilot's attempt. . .

HE briefed the flight for division tactics. He was to lead and I was to take off on his wing with the second section of F9F-8Bs following at a 10-second interval.

"The section takeoffs and rendezvous were normal and we continued through the hop crossing sections and wingmen on the climbout. At 25,000 feet we commenced break-ups and rendezvous and upon completion of that we went into tail chase and did wingovers for about 15 minutes. The second section broke off and he and I shot a flameout approach. I missed it so we tried another. I touched down on this approach and he joined on my wing.

"After climbing to 6000 feet he asked me if I wanted to break off or join him on a low pass. I told him I'd go with him and he said 'short briefing, step up.' He got clearance for runway 25 and we began the pass. It was uneventful and at 5000 feet he told me to break off and land. He was cleared for another pass and I stayed at 5000 feet to watch.

"He went in for the pass, pulled up, rolled to a 90-degree bank on his left wing, and then all I saw was a ball of fire."

The "He" of the young wingman's narrative was an instructor pilot and the illustrated result of the imperfectly performed maneuver—a flapperon roll at about 50 feet and 500 knots—is brutal. About halfway across the field the jet started a slight pull-up simultaneously rolling to the left. As the plane rolled inverted the nose was seen to drop slightly and the attempted roll-through was made in scoop-out fashion. The right wing came through the bottom vertical position (270 degrees of roll completed) and hit. Debris was scattered along the flight path for nearly half a mile. The engine compressor impeller was found 4275 feet ahead of the initial impact point.

Most probable cause factor of the accident, according to the board, was a gross error in judgment in attempting the maneuver at such a low altitude and high speed, bordering on the critical limits of aircraft performance capabilities and pilot reaction.

From information in the accident report, the pilot's actions leading to the accident were completely foreign to his previous years of flying history. Thus when pondering the "why" of his attempted maneuver, the reason "error in judgment" seems somewhat inadequate, though accurate under the circumstances.

In the absence of any other specific explanation (the board considered self-annihilation but felt it was not valid) consider these items taken from the accident report and placed in chronological order. It must be quickly explained that they did not appear in this form originally and are simply spliced together from various portions of the report and endorsements. Any opinion formed must forever remain speculative.

For nearly two years this pilot flew in a jet squadron as a flight instructor in F9F models where

to slow roll at low altitude was a sudden impulse, or whether it

his performance was characterized by fellow pilots as being probably a little above average for his rank and experience. He was considered very capable and gave the impression of confidence in regard to flying.

In his assigned duties he seemed acutely aware of safety problems and uniformly flew with the stability expected of an experienced pilot. Most fellow pilots expressed surprise that he attempted the maneuver which resulted in his death. Towards the end of his tour with the squadron he was given the duties of Aviation Safety Officer. The squadron won the CNO Aviation Safety Award for the fiscal year and the board felt the pilot "contributed greatly toward this award."

Orders came, and the pilot was transferred to a rather isolated air station with duties as Assistant Operations Officer. At this station the opportunities for jet flying were limited. In the several months that he was assigned to the station there was nothing to indicate that he had changed his philosophy toward flying. In effect the picture seems to be of a mature, experienced pilot who has both himself and the airplane under control.

Then one Sunday, surprise! The pilot's old squadron was deployed and came booming into the field where he was Assistant Operations Officer. As the report says, he was "well known to the instructors and was in constant social and professional contact with them" from the time they arrived until the accident six days later. Due to his "excellent performance as an instructor" he was again utilized as such by the squadron. His former squadron mates noticed no unusual physical or mental conditions during this period.

Though no unusual conditions were observed there was nevertheless a change in the pilot's attitude from the time his old squadron arrived at the field. In the next four days, while flying F9F-8Bs, he twice called for a low pass across the field. The tower refused the request on the first occasion. The second time another pilot on the same frequency recommended that the low pass not be made. The man in question did not attempt it.

On the fifth day, a Friday, a pilot delivering a plane to the squadron called for a low pass, and the operations duty officer attempted to call the station operations officer for instructions. At that point the assistant operations officer entered the office and set the precedent for permitting the maneuver by directing the duty officer to clear the aircraft for a low pass. The pilot delivering the jet evidently made up for the delay in getting his low pass as he climaxed it by a roll; the maneuver which was to cause the crash the next day.

On Saturday he was senior officer on board in the operations department and who is going to tell the acting operations officer how to fly his airplane? So he was cleared for the first low pass with his wingman and made out. Then he was cleared for the second. You know the result.

From the circumstantial evidence an opinion can be formed that the arrival of the pilot's old squadron and his apparent change of attitude are somehow connected. The question of "why the attempted slow roll" is not brought any closer to a factual answer of course, but the reader's speculations may have a more solid base. There are many possible answers: pride, conceit, overconfidence, exuberance, exhibitionism, or just plain trying to prove to his old squadron and himself that he was still a capable jet driver.

If he is trying to "look hot," to whom does he look hot? To the layman, and maybe to the young pilot, he may be a real "ace." But to the professional aviator he proves he isn't. The pro is not impressed except adversly, for the pro considers any risk, without the promise of adequate compensation, a stupid error, displaying a lack of the judgment necessary to become a professional aviator.

If he is trying to prove he can handle his plane, it isn't necessary. The word about how good you are gets around. Each pilot evaluates the pilots he flies with, and, as we all know, the evaluation does get around.

Such maneuvers do not impress the people worth impressing.

Whatever you theorize, the lesson seems clear: the rules (OpNav, doctrine, etc.) are based on past history. If your "impulse" leads to breaking the rules, there is a hazard to it. ●

r it planned long before... either way the result was fatal.

GOT IT MADE?

By

Richard M. Wenzell

Chief Engineering Test Pilot

Columbus Division, NAA

Looks pretty good—yet there *is* a mathematical probability that you don't have a winning hand. Now what about your next takeoff with a full load? Will you make sure by the book that you've GOT IT MADE, or will you gamble?

FIELD takeoffs with heavy, and sometimes asymmetrically loaded, airplanes operating on marginal runway lengths and under adverse conditions offer a challenge to the most skilled naval aviator.

Several recent field takeoff accidents would not have occurred if the pilot had considered more carefully some of the factors involved prior to takeoff.

While it is the purpose of this article to discuss some of the takeoff factors to be considered with the FJ-4 and FJ-4B *Fury* series when external store loadings result in overload and/or asymmetric conditions, the general procedures are applicable to all jet aircraft. All numerical examples used herein refer to the FJ-4 and 4B airplanes.

Now, grinding out a heavy gross weight takeoff on a hot day at Albuquerque is no fun. But it can also be no-sweat if the operator knows what to expect of his machine and knows how to *check* that he is getting the advertised performance. Chewing up great lengths of runway and just trusting to luck that the takeoff will be successful exhibits splendid intestinal fortitude, but why not save the guts until they're really needed?

With a little planning and practice, you can know beyond a reasonable doubt that the takeoff can or cannot be safely performed prior to stepping into the cockpit and you can also check takeoff performance while there is still sufficient distance to abort successfully.

Takeoff Planning

BEFORE undertaking a mission during which takeoff distance and/or controllability may be marginal, the takeoff performance charts and the Flight Characteristics section of the *Supplemental Flight Handbook* must be consulted to determine the effects of runway air temperature, airplane gross weight, field pressure altitude, wind, velocity (headwind and crosswind components) and pilot technique on takeoff distance.

Even after considerable experience with specific airplane configurations, the pilot cannot, *to a safe degree,* integrate from past experience alone the takeoff distance required because of the many variables that influence takeoff distance. Therefore, it is essential that *Supplemental Flight Handbook* data be consulted to insure arrival at a valid figure.

Get the Facts!

Airplane gross weight and field pressure altitude are relatively easy to determine and both have tremendous effects on takeoff performance. A 5000-pound increase in gross weight in the FJ-4 for example, can increase the takeoff distance as much as 96% and by operating from a 5000-foot pressure altitude field instead of a sea level field (all other factors held constant), the takeoff distance can be increased by 65%.

Ambient air temperature is easily determined, but it must be obtained for you from a runway location — not at the tower because the air temperature at intake height above the runway may be considerably higher than the air temperature at the tower and adversely affect takeoff distance (the temperature will also vary on the upwind & downwind sides of the runway). For example, a 5° C. increase in temperature can increase takeoff distance 12%.

Wind velocity has a great effect on takeoff distance. However, wind velocity and direction changes are many times unpredictable. A 10-knot reduction in headwind component during the takeoff roll can increase takeoff distance 9%. A shift from a headwind to a crosswind at constant velocity not only reduces the headwind component and thereby increases the takeoff distance, but the crosswind component may require prolonged braking during the takeoff run resulting in an even further increase in takeoff distance. Therefore, if the runway length is critical, use a conservative wind velocity value if the winds are steady. If the winds are shifting and gusty, do not rely on the wind to provide your takeoff distance margin.

Takeoff Distance Chart, [Supplemental Flight Handbook (Confidential)] shows the takeoff distances that can be expected using *operational, not minimum,* lift-off airspeeds as functions of the variables listed above and

Continued from preceding page

based on flight test data. From this curve, realistic lift-off airspeeds, corresponding takeoff distances and the total distances to clear 50-foot obstacles can be determined.

After the takeoff distance and the lift-off airspeed have been determined from this chart, determine the refusal speed based on runway length available from Refusal Speeds Chart. The refusal speed is that airspeed to which the airplane can be accelerated during the takeoff run and if thrust is reduced to idle, the airplane can still be braked safely to a stop in the runway length remaining.

Compute Refusal Speed

However, this information alone is still not sufficient to allow a check of takeoff acceleration (thrust available). Refusal airspeed corresponds to a specific distance. To determine this distance, refer to Stopping Distances Chart, and plug in the refusal airspeed. The corresponding stopping distance is then subtracted from the total runway length available and the difference is the distance necessary to accelerate the airplane to refusal speed.

In some cases the refusal airspeed will approach or exceed the recommended lift-off airspeed when the operating conditions are favorable for short takeoffs and a long runway is available. This condition is usually prevalent when operating the clean airplane and the advantages are obvious.

Now we have an essential portion of the information required for a successful takeoff or abort. If refusal speed is not attained in the corresponding and predetermined ground roll distance, the takeoff must be aborted. An engine failure that occurs after exceeding refusal speed/distance must be handled to suit the specific conditions and is discussed later under "Aborting." If the specified takeoff airspeed and pilot techniques are adhered to, the predicted takeoff distance will be realized.

Skill and Judgment Needed

UNFORTUNATELY, pilot technique is always a major factor in effecting safe takeoffs. However, we have tried to reduce the importance of this factor by establishing takeoff procedures that are simple, require no unusual skill and comfortably provide consistent takeoff performance.

Even so, this does not mean that everything can be done by the numbers; *judgment* must be exercised during takeoffs as in all other phases of flight.

Maintenance Factors

THOROUGH preflight exterior inspections and cockpit checks by maintenance personnel and exterior and cockpit checks by pilots are necessary if consistently safe takeoffs at any weight or loading condition are to be achieved.

The condition of the wheel brakes is important because a warped disc may cause a dragging brake which will result in a takeoff distance increase and could lead to a blown tire due to overheating. Brake puck depths should be within the prescribed limits to insure smooth and maximum braking if takeoff is aborted.

Main wheel tire pressures should be equal and at the levels prescribed. A soft tire on one side will cause asymmetric drag during the takeoff run and may compound the adverse characteristics associated with the heavy weight, asymmetrically loaded airplane. Two soft tires will increase the rolling friction and increase takeoff distance. Tire walls and treads must be in excellent condition. Don't gamble with cut, gouged or bald tires.

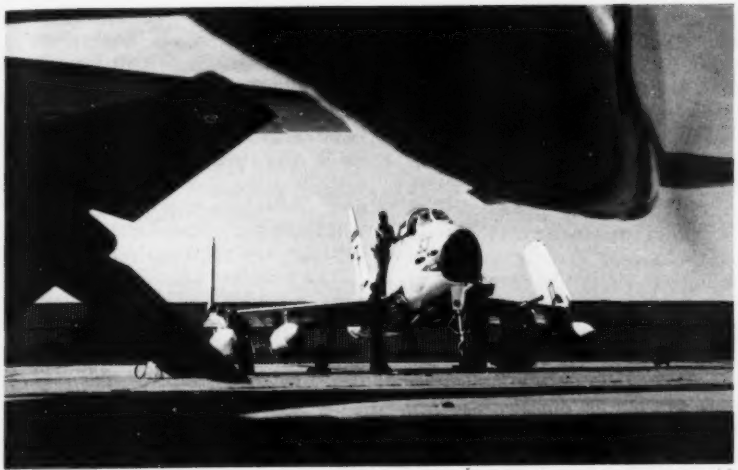
Be sure that tailpipe segments are installed symmetrically about a vertcial axis to eliminate yaw due to thrust.

Prior to takeoff (any takeoff), check that full deflection of all control surfaces in both directions and maximum control deflection *rates* are available.

Manageable control forces are provided in all *Fury* series airplanes even if the proper takeoff trim is not selected or if the trim actuator should malfunction and actuate to full throw in either direction (rare occurrence). The pilot can demonstrate this to himself on the ground by trimming the stick full forward and full aft and noting the forces required to hold or move the stick in the stabilizer deflection range associated with takeoff and cruising flight. These forces will be the same as those which will be encountered in flight under these trim conditions.*

Check operation of the alternate trim system, then set takeoff trim with the normal trim system. Although the control forces will always be at a manageable level no matter what trim is selected, precise control is difficult about any axis if abnormally high forces are encountered. Pilots are also inherently reluctant to overcome high control forces because they normally denote an aerodynamic or a mechanical restriction. So insure that the airplane is trimmed properly.

* With the stick trimmed full forward in the FJ-4B, approximately a 37-pound pull force is required to hold the stick at the takeoff position (4¼ degrees stabilizer nose down) and approximately a 24-pound push force is required to hold the stick at this position if the feel bungee is trimmed full nose up. Corresponding FJ-4 forces are even less.



Proper maintenance, and preflight check of engine trim, brakes and tires is critical.

However, flying the Fury strictly by control forces during takeoff may lead to dangerous over-rotation (this is discussed later under takeoff technique) or excessive ground roll distances due to the shift of the center of gravity with the numerous combinations of external loads possible and the possibility of improper trim settings. Therefore, it is paramount that the takeoff attitude be determined by reference to the airspeed indicator, the horizon and the angle of attack and stall warning system.

Takeoff Techniques

IF YOU'RE sweating takeoff distance, cram every available foot of runway in front of you and don't take off in formation.

After the normal engine acceleration check ("Primary" system), determine that RPM, EGT, fuel flow and oil pressure are normal and steady. If RPM * and EGT reductions of 1% and 15° C. are accepted for takeoff in lieu of military rated engine speed (100.0% RPM) and EGT, ** a substantial increase in the calculated takeoff distance will result from the reduction of thrust (approximately a 4.5% loss). For example, if the calculated takeoff distance is 4000 feet, this thrust loss can result in an increase in takeoff distance of about 15 percent. The same thrust loss results in an increase in takeoff distance of approximately 23% if the estimated takeoff distance is 6000 feet (higher gross weight).

Check the engine instruments periodically during the takeoff run to probe for signs of imminent engine failure. However, the best indication of engine operation will be airplane acceleration and the cockpit noise and vibration levels associated with the engine operating normally at full thrust.

If engine speed drops abruptly and a decrease in takeoff acceleration cannot be felt and all other engine instruments indicate normal operation, a tachometer failure has probably occurred. Oscillations of the tachometer needle without accompanying changes in thrust or the *EGT* also indicate an instrument system malfunction.

The same is true of the EGT indicating system, but be wary of steady gross overtemperature indications and abort if below refusal speed. Above refusal speed, it will be necessary to handle the situation as the specific conditions dictate.

A "LO" oil pressure indication should be cause for an abort up to refusal speed. Above refusal speed, it will again be necessary to follow a course of action predicated on that particular situation, but there should be several minutes of satisfactory engine operation available following a complete oil pump failure.

Individual engine thrust will vary, but the refusal speed/distance check will indicate engines that are significantly under thrust.

Make minimum use of the brakes and maximum use of the rudder and ailerons for directional control throughout the run and always use full rudder deflections in combination with braking. If you brake and don't have the corresponding full rudder deflection, you are paying a penalty in takeoff distance.

Rotate Slowly

Keep the nose-wheel on the runway until 10-15 KIAS below the recommended lift-off airspeed by applying forward stick to prevent excessive nose-wheel bounce. This procedure eliminates the possibility of "overrotation" (a high angle of attack that produces a correspondingly high drag) which can result in an excessive takeoff distance or may even prevent the airplane from ever reaching flying speed.

Then *slowly* apply back stick and *slowly* rotate the airplane so that it is flying at the recommended airspeed. (The airplane is ready to fly at the recommended lift-off airspeeds and a prolonged rotation to a relatively nose high attitude will not be

* Engine tachometers and EGT indicators should be calibrated at 100% RPM and 650° C. and these calibrations posted adjacent to their respective instruments in each airplane.

** Fixed-area exhaust outlets can be adjusted for only one set of operating conditions. Therefore, refer to the tailpipe temperatures at 100 percent RPM chart of the FJ-4, FJ-4B Flight Handbook, to determine the EGT required to obtain rated thrust at a specific ambient air temperature.

Continued from preceding page

required). The angle of attack should not exceed 16.5 units at the recommended lift-off airspeeds, but if the stall warning shaker is energized during rotation, immediately lower the nose and accelerate to a higher airspeed before attempting lift-off again.

As soon as the airplane is airborne, stop rotation and allow the airplane to accelerate in ground effect (up to a height corresponding to approximately ½ the wing span) to a comfortable airspeed before establishing a shallow climb.

In the event that the airplane is actually stalled at lift-off, immediately relieve back pressure on the stick to allow gentle return to the runway at a reduced pitch attitude and allow the airplane to accelerate to a higher airspeed before attempting another lift-off.

If the takeoff airspeed is greater than refusal speed in this case, and airplane acceleration appears to be too low to permit acceleration to an airspeed sufficient to allow another lift-off in the runway remaining-*jettison external stores* and execute a normal takeoff at the reduced weight and the greater airspeed margin above the corresponding stall speed.

Retract the gear when safely airborne, *but if the stall warning system is energized, do not retract the gear until* the airplane has accelerated above the stall warning speed range.* Retract the flaps at a safe altitude (200′ minimum) and at an airspeed *at least* 20 KIAS above the recommended lift-off airspeed.

If a climb must be made over an obstacle immediately after becoming airborne, leave the gear and flaps extended and *maintain the recommended lift-off airspeed* until the obstacle is cleared. Retract the gear when safely clear of the obstacle. Retract the flaps when the obstacle has been cleared and the airplane has accelerated to flap retraction airspeed.

* The rudder pedal shaker (stall warning) is energized by the ADD system at 19.0 — .5 units angle of attack.

If Yaw and/or Roll Develops

IF LIFT-OFF is made and the airplane shows signs of marginal control (aerodynamic yaw and/or roll as opposed to yaw and/or roll due to asymmetric loading), allow the airplane to accelerate in ground effect with the gear and the flaps extended until a comfortable airspeed is attained.

Remember, the preceding takeoff technique is designed to eliminate the possibility of "overrotation" during the ground roll by maintaining a low drag attitude (nose wheel on runway) until minimum flying speed is exceeded by a comfortable margin; only then is lift-off rotation initiated. Stalls during lift-off rotation are avoided by initiating rotation at an airspeed that provides a good margin above stall airspeed and by rotating the airplane *slowly* until airborne. Post lift-off stalls are prevented by stopping rotation as soon as the airplane is airborne, by crosschecking the lift condition with the angle of attack and stall warning system and by flying in ground effect until a completely comfortable airspeed is reached.

Asymmetric Loads

TAKEOFFS at heavy gross weights and with asymmetric loads present additional problems and modified procedures are required if these takeoffs are to be made consistently safe.

Asymmetric loads equivalent to or greater than 1000 pounds on a mid-wing (FJ-4B) station require full opposite rudder and aileron trim. For asymmetric loads less than this, rudder and aileron trim is correspondingly less; however, these time settings are not critical and precise settings are not required.

The heaviest asymmetric loadings possible (Mk. 28 store alone) may require full rudder and intermittent braking up to 105 KIAS with no crosswind component. It is obvious in this case that careful brake applications are required to prevent excessive takeoff distance or a blown tire due to over-heating or skidding.*

Moderate crosswinds are limiting factors when operating with asymmetric loads. Restrictions for Crosswind Takeoff and Landing Flight Handbook Chart, shows the maximum left and right crosswind components in which satisfactory control is available with any asymmetric loading (2000 pounds or less) on the left mid station. These curves are based on flight tests.

It the crosswind is from the same side as the asymmetric load, excessive opposite brake must be used during takeoff roll and excessive takeoff distances and tire failures may result in the danger region. Cross winds from the side opposite the asymmetric load lift the upwind wing which reduces the weight on the corresponding landing gear and decreases the braking effectiveness to such a low level that the airplane becomes uncontrollable directionally, and it will turn toward the asymmetric load. This region is also shown as a danger region.

* Several operating units are using "canted" takeoffs to reduce wheel braking requirements with asymmetric loads. The Contractor has very little experience with this technique, but squadron personnel indicate that when it can be employed, it offers advantages over the normal straight run takeoff.

It should be noted that the takeoff distance data were obtained with symmetric loads. Because of the additional braking required to maintain directional control with asymmetric loads, longer takeoff runs than shown by Flight Handbook charts should be anticipated.

Aborting

ALWAYS try to plan and execute every phase of flight to avoid critical situations, but always have a well thought-out plan of action for every critical situation conceivable and then when it presents itself—*ADHERE TO THE PLAN!*

It has already been shown how refusal speed and distance were determined using the charts in the *Supplemental Flight Handbook.*

If runway distance markers are not installed, it will be necessary to pick out a runway intersection or other landmark at a distance corresponding to the refusal speed distance.

The most insidious engine failure that can occur is one that results in a gradual loss of thrust, but a properly operating engine that is under thrust is the most likely situation to be faced. These conditions can best be detected by correlating refusal speed with the corresponding and pre-determined refusal speed acceleration distance. If the refusal speed is not attained when this distance is reached during the takeoff roll—*abort!* (Some pilots also figure the airspeed required at, say the 2000 foot marker, as a pre-refusal point howgozit.)

Up to refusal speed, the takeoff run can be aborted and sufficient runway length will remain to brake the airplane to a safe stop, assuming that idle thrust is selected, the nosewheel is immediately lowered and simultaneous, intermittent braking conducted above 100 KIAS and steady, hard simultaneous braking applied below 100 KIAS until the airplane is decelerated to taxi speed or stopped. This also assumes that the flaps and droops remain extended and the speed brakes closed during the entire abort. This procedure simplifies and reduces to a minimum the importance of pilot technique and provides conservative, but realistic stopping performance figures. However, it should be noted that handbook figures are based on dry hard surface runways, and probably could be lower for a slippery one. (See "Long and Short of It"—APPROACH, June 1957.)

The stopping distance can be reduced even further by immediately lowering the nose-wheel to the runway (if not already there) upon decision to abort and simultaneously shutting down the engine to eliminate idle engine thrust, retracting the flaps and droops to reduce lift and increase the normal force on the main gear, extending the speed brakes and opening the canopy to increase drag and by judicious use of simultaneous, but intermittent braking above 100 KIAS and steady, hard simultaneous braking below 100 KIAS until stopped.

In either case, braking requires good pilot technique particularly above 100 KIAS, because of the high level of kinetic energy which makes it very difficult to detect skidding tires due to the apparent low airplane response (longitudinal deceleration —g) to braking action and a significant reduction of weight on the main gear as the result of wing lift in the normal ground attitude even with the flaps and droops retracted. Intermittent braking should be conducted above 100 KIAS in order to obtain maximum effectiveness, yet prevent skidding tires which fail very quickly. Remember, an inflated tire, if used properly, has a higher coefficient of friction than a skidding blown tire and/or wheel.

Richard M. Wenzell, chief engineering test pilot for the Columbus Division of North American Aviation, Inc., and author of Got it Made, poses for a headgear fitting by Don L. White, instrumentation engineer at the Columbus Division of North American Aviation, Inc. White is fitting him with helmet cameras to record instrument readings, or flight testing of an airplane he is chasing.

Even if the best braking technique is employed following an abort initiated at the refusal point, brake "fade" may rear its ugly head and reduce brake effectiveness to little or nothing during the last portion of the roll-out. However, the consequences of rolling off the end of the runway at very low speeds are minor and external stores can still be jettisoned to utilize to a maximum the braking effectiveness that remains.*

* If you do overrun and go off the end of the runway, do not use brakes. Hold full back stick and let aircraft decelerate on its own accord. The use of brakes on soft ground could cause the nose wheel to dig in and shear.—Ed

Continued from preceding page

If partial or complete power plant failure should occur *after* exceeding refusal speed and distance, immediately switch to Emergency Ignition and the Manual fuel system. If the power plant does not immediately resume operating at high thrust:

- *Jettison external stores*
- Stop-cock engine
- Lower nose-wheel to runway (if not already there)
- Retract flaps
- Extend speed brakes and open canopy
- Cautiously apply simultaneous, intermittent (about one application per second) brake above 100 KIAS—do not SKID tires
- Apply simultaneous, steady, hard brake below 100 KIAS —do not SKID tires

If runway arresting gear is available, you probably have most aborts "made" whether the above procedures are followed or not, but many fields do not provide this equipment or it may not be tactically feasible to wait until the equipment is re-rigged or repaired following an emergency engagement or change of duty runway.

Happy takeoffs and landings!

So prepare for the worst. Plan your heavy weight takeoffs conscientiously and practice checking refusal speed against distance and applying the recommended techniques until you can slowly and smoothly rotate the airplane so that it is airborne precisely at the recommended lift-off airspeed. Practice some climbouts over imaginary 50-foot obstacles using the recommended techniques. Optimize your braking techniques both above and below 100 KIAS during normal landings.

No-Flap Takeoffs in FJ-3 & FJ-4 Airplanes

In a recent letter from BuAer, comments were requested as to the advisability or nonadvisability of performing no-flap takeoffs in FJ-3 or FJ-4 aircraft. Several recent Aircraft Accident Reports have described takeoff accidents which indicate that the takeoffs were attempted with the flaps up. The no-flap condition was not listed as a contributing factor to the accidents but, since the practice is not in accordance with the takeoff procedures contained in the FJ-series Flight Handbooks, the contractor recommends that takeoffs in FJ-3 and FJ-4 aircraft be made with the flaps down.

In an investigation of the no-flap takeoff problem, a series of tests were performed and, as a result, it has been determined that:

1. **If a no-flap takeoff is performed in an FJ-3 aircraft, the lift-off speed should be increased approximately 5 knots above the recommended flaps-down speed. This 5-knot speed increase is applicable at all gross weights to provide satisfactory handling characteristics during lift-off. Due to the required lift-off speed increase, the ground roll required for acceleration will be increased. Dependent upon atmospheric conditions, the takeoff distance at sea level will be increased 300 feet for a lightweight takeoff at 120 knots on a Standard Day (59° F) and 900 feet for a heavyweight takeoff at 140 knots on a Hot Day (100° F).**
2. **If a no-flap takeoff is performed in an FJ-4 or FJ-4B aircraft, the liftoff speed should be increased approximately 10 knots above the recommended flaps-down speed. The additional 10-knot speed increase is applicable at all gross weights since wing lift afforded by both the leading and trailing edge flaps will not be available. The ground roll required for lift-off with the flaps up will vary with atmospheric conditions so that at sea level, the distance will be increased 800 feet for a lightweight takeoff at 130 knots on a Standard Day (59° F) and 1800 feet for a heavyweight takeoff at 150 knots on a Hot Day (100°F).**
3. **During any no-flap takeoff in an FJ-series aircraft, the increased ground roll may cause the pilot to attempt premature lift-off or over-rotation after lift-off. Either action could result in a stall which, at low altitude, could be extremely dangerous. During takeoff acceleration, the increased ground roll required to attain refusal speed will decrease the length of runway remaining to a point where a safe stop may no longer be assured at refusal speed.**

In view of these facts, all takeoffs in FJ-series airplanes should be made with the flaps down as prescribed in the FJ-3 and FJ-4 Flight Handbooks.—*NAA Service News*

Noting that the why's, what's and wherefore's of afterburners have never been given much publicity, ComNavAirLant Power Plants Officer LCDR Dave Saunders devotes the second in his series of engine articles to . . .

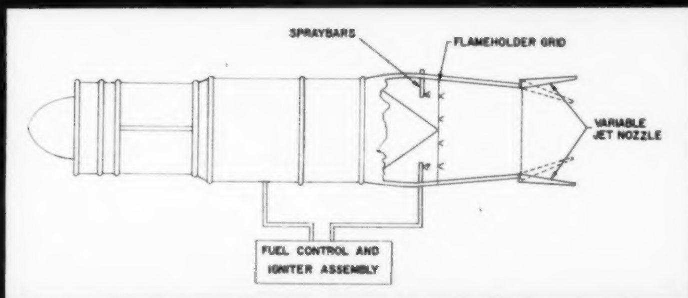
FIRE TWO!

THE reason for putting an afterburning engine in an airplane appears obvious—more thrust and more aircraft performance in terms of takeoff, rate of climb, acceleration, altitude and speed. It is pretty difficult for a fighter or interceptor to be competitive these days without an afterburner. With the introduction of the Air Force B-58, we now have afterburning bombers.

The use of an afterburner, however, compromises other aspects of aircraft performance—primarily due to its voracious appetite. For a typical fighter mission, it means reduced range and reduced cycle time. Reduced cycle time imposes heavy loads on carrier forces since it reduces the turn-around time between launches and increases the frequency of times the carrier must turn into the wind.

What is an Afterburner

Afterburners have often been compared to stovepipes — and this remains a good analogy. It can be seen in Fig. 1 that the only essential components of the



afterburner system other than the pipe are the afterburner fuel control and igniter, fuel spraybars, flame holders, and exhaust nozzle.

The afterburner is as inefficient as it is simple. At full power, it uses more fuel than the basic engine, yet develops only one-third to one-half as much thrust. Its operation is similar to a blowtorch or ramjet where fuel

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is mixed with a stream of air and burned to produce heat. The additional heat is used to accelerate the flow of exhaust gases through the nozzle. Air is available to support afterburner combustion because the basic turbojet engine inducts for cooling purposes about four times as much air as it needs to support its own combustion.

The general sequence of afterburner operation is as follows:

1. Pilot selects afterburning through proper positioning of the throttle.

2. Afterburner fuel control signals igniter piston to discharge a small quantity of fuel into the basic engine combustion section. This "hot streak" of fuel ignites and continues to burn as it is carried downstream, through the turbine and into the afterburner. The control then ports fuel to the afterburner spraybars and it is ignited by

the "hot streak."

3. The rear tailcone and case of the basic engine which uses an afterburner is designed to diffuse, i.e. slow down, the air as it comes from the turbine. The slower the airflow entering the afterburner, the better the combustion process. However, in order to keep the flame from blowing out immediately, it is also necessary to use flameholders. This arrangement of gutters improves the mixing of fuel and air, and slows the mixture down enough to provide a stabilized flame front.

4. The afterburner fuel control still has two more jobs to perform. The first of these is to open the exhaust nozzle just before or just after ignition (timing depends on engine type). The increased nozzle area is required to prevent excessive temperatures and pressures in the afterburner and at the same time provide the desired velocity of the gases through the nozzle.

5. The last function of the afterburner fuel control is to automatically provide the correct fuel flow for the particular basic engine operating condition (depends on throttle setting, altitude, etc.). If the fuel-air mixture becomes too rich or too lean, afterburner instability or blowout will occur.

Afterburner Malfunctions

Recently, there seems to have been some tendency for pilots to regard the afterburner as an auxiliary engine and to continue flying when the afterburner malfunctioned. However, the afterburner is mated so intimately with the basic engine that its malfunctioning may either precede or be indicative of a more serious basic engine problem.

If the afterburner fails to operate below 30,000 feet, an overall engine malfunction exists and the pilot should make a precautionary landing. Above 30,000 feet, afterburner operation depends on the type of aircraft and flight conditions. In this regime, an intimate knowledge of the aircraft and engine will enable the pilot to decide whether or not afterburner operation is satisfactory.

A few specific malfunctions are discussed below:

1. *Nozzle fails to open*—If the nozzle fails to open as soon as the afterburner lights, there will be a rapid rise in tailpipe temperature and a decrease in RPM. If this condition exists for more than a few seconds, discontinue afterburning operation immediately.

2. *Nozzle opens asymmetrically*—Sticking of some of the nozzle segments or failure of a portion of the nozzle actuating system to function properly may result in an off-center opening. Depending on the degree of asymmetry, this will produce an out-of-trim condition which can become quite severe at low speeds. If conditions permit, terminate afterburning as soon as the trim change is noted.

3. *Afterburner "honking"* — This phenomena gained its name from the peculiar noise it makes and is associated only with the J65 in the F11F. It is a form of combustion instability (due to pressure surges in the afterburner fuel system) which takes place when the throttle is retarded below approximately 93% rpm while in afterburning. No damage has been caused by "honking" to date, but, like any other form of instability, it should be eliminated when it occurs by terminating afterburning or advancing the throttle above 95%.

4. *Afterburner blowout*—Loss of combustion in the afterburner can be caused by compressor stall, malfunctioning of the control, interruption of the fuel supply (due to failure of the afterburner pump, blockage of fuel line, etc.) and gun or rocket firing. In addition, there is a definite altitude limit for afterburner operation which depends on the aircraft speed and type. At this limit, the pressure in the afterburner falls below that required to support combustion. Due to the ram air pressure effect, the higher the aircraft speed, the higher the limiting altitude. Since it is easier to keep a fire going than to start one, the relight altitude is generally 4000 to 5000 feet lower than the blowout altitude.

Pilot Technique

A list of afterburner "do's" and "don't's" might read as follows:

DO check the afterburner prior to takeoff if model aircraft and conditions permit.

DO check the area behind your plane for personnel and equipment before lighting the afterburner on the ground. The afterburning danger area is more than double that for military power.

DO keep close track of fuel consumption while afterburning.

DON'T keep the afterburner lit on the ground any longer than necessary—cooling of the afterburner and surrounding fuselage area is critical during ground operation.

DON'T keep flying if the afterburner malfunctions unless it is absolutely necessary—make a precautionary landing and determine what is wrong.

Detailed Procedures

This discussion has, of necessity, been general in nature and is intended to serve merely as a guide. Flight operational procedures as contained in the various flight handbooks are a careful integration of information pertaining to a specific airframe, a specific engine, and specific accessories. A thorough knowledge of these procedures will enable a pilot to not only prevent many emergencies from ever occuring, but, should they occur, enable him to quickly analyze and correct the trouble. Such a knowledge is definitely a "Safety of Flight" item. ●

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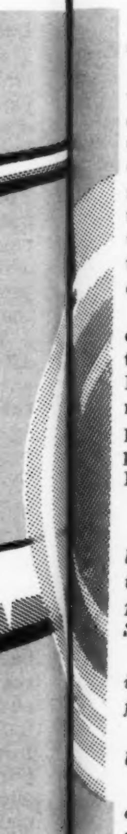


SIDE EFFECT

THE pilot had 600 hours total, I was a green card copilot.[1] We took off in an SNB from Capodichino airport Naples, destination Catania, Sicily. The first leg to Caraffa at 9,500.[2] We were in the soup all the way, the birddog functioned perfectly, directing us over the 1000 watt Caraffa homer. Light to moderate icing was easily broken off by the boots.[3]

Caraffa station passage was uneventful, though we were encountering scattered thunderstorms.[4] Everything at this time was normal except for the loss of the pilot's airspeed indicator (Copilot's worked satisfactorily.)[5] Passing Caraffa we turned towards Catania, heading 210, left airways and commenced a let down to 8000.

Fifty miles from our destination we broke into the clear momentarily and established a VFR fix.[6] We were on course, but had picked up considerable ground speed; winds had been forecast 150 degrees 30-kts.[7] Darkness was approaching as we reached the Catania control area (20 miles out). Positive I.D. signals on Catania beacon (250 watts) were established with the bird-dog steady, but pointing 30 degrees to starboard. Thinking that our drift correction was too great we took up a heading of 240 degrees, the birddog now steady "on the nose." Our clear area had long since passed and we were now encountering severe turbulence.[8]

Contacting APC we gave our position and were given a steer of 191 degrees to the field. This seemed impossible to us since we were heading 240, birddog still "on the nose." As I prepared to verify the steer the pilot suddenly nudged me and pointed to the glowing red warning light of our radio altimeter. We both stared at it unbelievingly as it went from 1000 feet to 500 — 400 — 300, we were supposed to be over water at 8000'!

I could see ground below us to the right through a break in the clouds; the pilot started a left turn and then we saw IT directly in front of us—snow and rocks; the bird-dog had homed in on Mount Etna, 10,500 feet high! I grabbed the controls and pulled up into a violent right wingover as the pilot lunged shoving prop, mixture, and throttle controls full forward. There couldn't have been over 50 feet separating our belly from the 60 degree sloped side of the mountain.[9]

Completing the wingover we backtracked towards Caraffa, and found our clear area once again. We had lost VHF radio contact with APC due to the mountain being between us and the field. Letting down over water we pro-

[1] *"Copilot" I'll sit back and relax on this trip. This was about the 6th trip both myself and the pilot made over the same route. Strictly routine!*

[2] *A little high for the* Beech *on instruments, but it was minimum for our direction of flight.*

[3] *Small concern here—just let it build up then break it off.*

[4] *Passed it within 2 min of our estimate — this flight is really routine.*

[5] *No! The pitot heat was on since takeoff.*

[6] *What luck!*

[7] *Why can't somebody predict winds! I thought direction was off, actually velocity was in excess of 50 kts!*

[8] *Well at least every thing was under control at last.*

[9] *Good grief ! ! ! We're still alive!*

-and his hairy tales

Continued from preceding page

ceeded below the clouds VFR to Catania, where a shaky, but uneventful landing was made.[10]

Our mistakes:[11]

(1) Believing 100 per cent in our birddog, due to its prior faultless functioning. (2) Forgetting about the forecast winds, which helped blow us toward Etna. (3) Not taking immediate action on the VHF steer information. We owe our lives to that last remaining bit of day light, that wonderful radio altimeter and a "little bit of luck."

[10] *The smoothest runway I've ever been on.*

[11] *Of the mistakes there are many more, such as why make the flight at all. I guess it would have been a lot easier to have stayed on the deck and had dinner and a "few" at the "El Sombrero".*

The birddog works so good most of the time that it's easy to forget its possible irregularities. Besides thunderstorms, the trusty needle can be diverted by such phenomena as twilight effect, shoreline effect or improper tuning.

As an indication of the strength of the homer involved, it should be noted that by U. S. Standards it is only required to be good for at least 25 miles.

Suggest you grab a new All-Weather Flight Manual and read the full ADF precautions, both pages 18-4 and 18-5, before your next hop.—Headmouse

NON-AWARES

"THIS Mouse hadn't flown for about 10 days and, hot to trot, he accepted a spur-of-the-moment chance to get some rear seat TV instrument time. I raced down to the aircraft and met the pilot who was ready to go.

"I strapped in and the whole flight from ground up to back down was enjoyable and normal in all respects — except — when getting out I discovered that the leg straps of my chute had not been fastened at any time!

"This mouse also had two mechs assist in buckling me in and this made three non-awares. Good thing everything went O.K. It would have been embarrassing if the panic button was depressed."

COLD BOLD

"AFTER delivering a VIP to a northern air station I rushed to get my bird into the air and back to the sunny south. The outside temperature and wind was too cold for my summer flying suit and leather jacket.

"While waiting for my clearance I closed the canopy to keep out the wind but by the time I received the clearance, lit off and taxied for takeoff, I was so cold that heat was my only intelligent thought, and to get airborne was the only answer.

"After a brief takeoff check list I started my roll. Just as the nosewheel broke ground the canopy lifted off the rail. I hurriedly latched it down. Had it torn off I wonder if I would have been able to land the aircraft due to the 200-knot wind I would have had to withstand at that cold temperature? I doubt it because I obviously was incapable of flying when I took off.

"Recommendations? Wear flying gear compatible with all weather along the flight route and read the checklists."

SOLUTION?

"Upon return from a routine night hop in F9F-8s, my flight leader and I made a normal break with myself taking a double interval. I heard him call the 180 spot with 'gear-down-and-locked.' The wind was 30 knots and blowing a 90 degree crosswind so I was concentrating on my pattern.

"I called and received clearance to land number two even though the tower had no idea where number one was, or *that he had landed wheels up!*

"At the 45-degree spot, I decided the approach was too poor, so I waved off. As I passed over the runway I noticed the number one man wheels up in the middle of the runway. I then notified the tower. Thank goodness for that hairy crosswind!

"Solution: (1) one runway duty officer with flares, (2) Much sharper tower operators."

Maybe we should just always put down the wheels, and release some men for other duties!—Headmouse

"DUDMOUSE"

THIS is a first for this particular mouse but it is an oft-observed delinquency. Being in a hurry and thinking of too many things at once for my poor shrunken little head I ran the Able Dog up to thirty inches and turned off the mags. I realized immediately that I had gone too far so—*back to both.* Loud roaring noises shook the mousecage. What else!

There was no replacement for the downed aircraft and with the flight gone on a three hour hop mouseless I reviewed the error. (1) Mags should have remained off closely followed by mixture to idle cutoff. (2) Error requires maintenance to pull strainer, induction system, and throttle check. (3) Anymouse missed hop which puts him behind flight.

It is for sure this mouse will show greater control over his eager left hand on that little switch from now on.

FROSTY LINE

"OUR GCI letdown in the Canuck from 42,000 to 25,000 feet was without incident. About 40 miles out I started the letdown to 30,000 feet, using a slow rate of descent and a speed of approximately 240 knots. I was cleared to report when I passed through 15,-

000 feet, but GCI requested my altitude as I was passing through 17,000 and had about seven miles to go before reaching the GCA pickup point. So I increased my speed and rate of descent in order to get down to 3,000 feet before arriving at that point.

"Then I began to realize that something was wrong. My speed and rate of descent were high but the altimeter was not indicating properly. There was a low cloud level at approximately 3,000 feet, so when I reached the tops I decreased my rate of descent.

"At this time GCI advised me to orbit. Our indicated altitude read approximately 11,300 feet—just when the navigator advised that we had passed through 3,000 feet. Immediate recovery action was taken and we climbed to 5,000 feet as indicated on the navigator's altimeter—but not before we dropped to 2,000 feet. My own instrument at this time was stationary at 11,250 feet. When the orbit to starboard was completed, I handed over to GCA and completed my letdown by having the navigator call the altitude every hundred feet until I was able to make the final approach and landing visually."

The pilot suggests that a VFR day flight be made after modification or replacement of flight instruments and that on all letdowns the navigators should call the altitude every thousand feet below 10,000.

Had it not been for the navigator's alertness and the fact that the existing cloud condition was known, this near miss might have ended up as an accident, "Cause Obscure." When the altimeter was checked later, it was found to contain water which quite likely froze and caused a stoppage in the instrument. The altimeter showed no indication of humidity during a pre-installation check but it was installed outside on a moist day. Nevertheless it is suspected that poor maintenance practices were responsible for the water not being spotted prior to installation.—*Near-Miss in "RCAF Flight Safety Review"*

HIGH LEVEL TORNADO

"ON 27 March I was assigned a TV-2 for return to NAS Glenview from El Centro with a dual pilot assigned to the back seat for instrument training. Early in the morning we made out a flight plan for NAS Dallas then attended a weather briefing.

Weather was clear to El Paso, becoming overcast at Salt Flats. From there to Dallas the ceiling below the overcast dropped progressively lower with Dallas forecast to have 2500 broken, 12,000 overcast and six miles visibility by ETA. I filed IFR with a VFR climb to 39,000 feet from El Centro.

"Over Abilene on schedule, we got DAL weather as 3700 broken, 5000 overcast. ATC cleared us to descend to 20,000 to Grand Prairie Homer. We were cleared to the Center and then to approach control and as we arrived over Grand Prairie were cleared for a penetration.

"As we arrived over the homer (heading 085 degrees) I had the penetration plate with me in the front cockpit. Conditions were 75 percent, speed brakes up and 210 knots. A turn to the south put the ADF needle on the tail so we turned right to 360 degrees in order to get north of the station, for a positive station passage prior to penetration on course. We had gotten to about 270 or 300 degrees heading when we broke out into a small hole. I looked up and saw the clouds coming; it was a white wall with a dark spot. Then I went back on the dials.

"In a 30 degree bank, 200 knots, rain hit the windshield then long white streaks went up the windshield. Immediately the artificial horizon tumbled, needle and ball played from side to side, and noise of some kind was heard. I felt a very heavy G load. The plane was completely out of control. There were three flashes like lightning about this time and I decided the only way left was to eject. With the G force it took great effort to reach the canopy handle. I pulled

Continued from preceding page

down and back as far as possible but the canopy did not blow."

The canopy system was later inspected, the initiator fired and no discrepancies were found. It was believed the pre-ejection lever was not moved far enough aft).

"As the speed seemed to be terrific I went after the speed brakes and finally got the control to the down position. As nearly as I could tell the altimeter was spinning through 10 or 11,000 feet. Shortly things started to steady up and the G load, which had seemed to be constant up to this period, eased off. I then got the needle in the center, altimeter slowed down and the artificial horizon righted itself. The plane was in near level flight on a 270 heading at from 3500 to 4000 feet at 210 knots. The throttle had never been changed from 75 percent.

"Shortly thereafter we were in smooth air below a ragged ceiling and I saw the lake located south of Hensley Field off to my left. I called Hensley, canceled IFR and got landing instructions.

"The air was smooth going in and smooth coming out, but I have no idea where we went or what kept the TV-2 together for what seemed quite a little while. The only thing I can see is that we must have been in the vortex of some kind of a storm although I had not received any warning of storms. It seems impossible to pull a positive G load of two which seemed to be constant, and come apparently straight down. We must have been in a very tight spiral of some kind. My pencil which was laying on the right hand edge of the windshield was still there when we landed."

Command comment on this report noted that the accelerometer indicated 12-G. Also it was noted that existing and forecast weather in no way indicated adverse conditions and therefore the decision of the pilot to file for Dallas was sound. It was the opinion of the command that the aircraft became involved in a high level tornado.

The fact that the occupants failed to eject may have in all probability saved their lives. Exposure to the severe turbulence could have collapsed or caused serious damage to the parachutes.

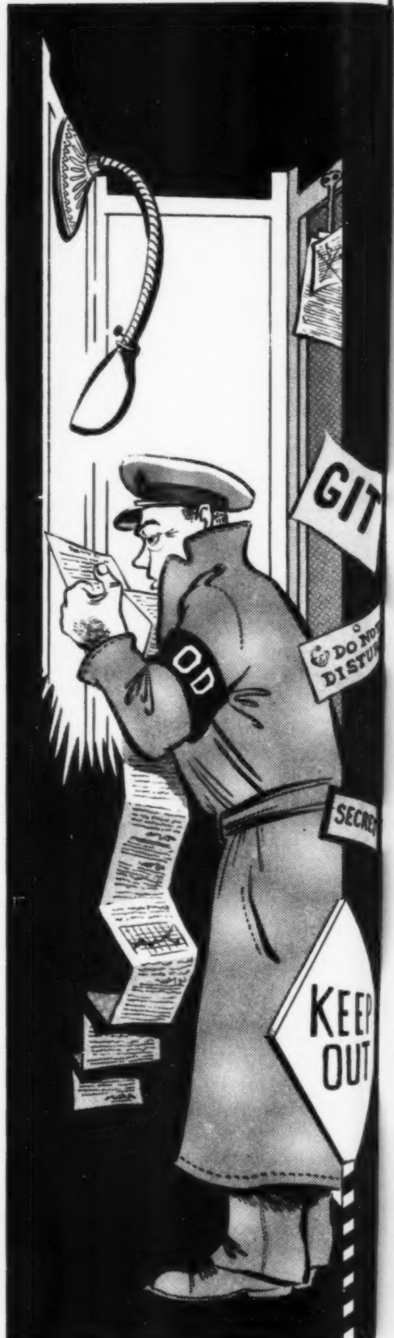
I'VE GOT A SECRET

"A SQUADRON plane captain recently turned up a P2V-5F after completing minor work while the aircraft was on the line. He removed the engine work stand, and a piece of cowling, to a position outboard of the starboard jet to keep it clear of the props during turn up. The fairly strong winds from the northeast blew the section of cowling from beneath the work stand, across, below the fuselage and into the port prop. The plane captain shut down the engines, reported to the Duty Officer that a piece of cowling had gone through the prop, and noted it in the maintenance log.

"The damaged prop was next noted by the Operations Officer in his pre-flight check prior to a training flight on Monday morning. Nobody told him, he had to find it out for himself. The plane was downed for a complete prop check by FASRON.

"Somebody, in this chain of events managed to put two strikes on the Operations Officer and his flight crew. He was completely in the dark on the very important fact that this flying machine was mechanically damaged. *Other* squadron people were aware of this fact but some place along the line the "*word*" did *not* get passed.

"It appears that the word stopped in the Duty Office. It did so because the plane captain reported that the damage was "within tolerances" and the Duty Officer considered the plane captain's verbal report to be final authority.



This action was taken without even a visual check on the damaged propeller by the Squadron Duty Officer. It must be assumed that the Squadron Duty Officer considered the plane captain a very responsible man to accept his word that the damage was so minor that nothing need be said about it. If the plane had crashed on takeoff due to the props being out of balance or track, the responsibility would *not* have been the plane captain's. He covered himself with the note in the maintenance log and though he *was* guilty of not stating the incident clearly, he did state that *something* had happened and the Squadron Duty Officer was therefore responsible to find out just what it was.

"The whole point of this centers around the subject of *RESPONSIBILITY*. No matter who you start with, the responsibility in this incident finds its way to the Squadron Duty Officer as follows:

(a) The plane captain *told* the Squadron Duty Officer. It was the Squadron Duty Officer's responsibility to understand *what* he was told.

(b) The Assistant Squadron Duty Officer noted it in the log. He works directly for and with the Squadron Duty Officer, it was the Squadron Duty Officer's responsibility to know *what* went into the log.

(c) Certainly, anything pertaining to the aircraft and safety of flight is a responsibility of the Squadron Duty Officer.

To sum it all up the Squadron Duty Officer has one helluva responsibility and a big part of his job is to simply "PASS THE WORD".

VOR CHECK

"THE forecast for a Friday evening, southbound cross-country, was 500 and 1 at home base, 300 and ½ minimum en route, light rain, scud, winds variable southwesterly in advance of a cold front at 45 knots with gusts up to 60 knots, and a very light turbulence.

"The freezing level was about 5000 feet and there had been one pilot report of rime ice at 8000 feet south of Washington, D. C. The forecaster predicted clear weather south of a point about 200 miles south on my route. I had about 550 hours in the S2F, a total of about 200 night hours with 150 instrument hours of which over 50 was actual instrument.

"Takeoff and climbout was uneventful except for a load of rime ice. Deicers had been checked and were functioning properly and I was carrying a little more power to compensate for the ice. Radar departure control released us on course to the omni station.

"The ARC-5 had gone out and the ADF was performing its usual bad weather dance and was almost completely unreliable. No strain there though, I thought, since I was filed southbound on victor airways. Because of predicted headwinds I did not burn excessive fuel with a too high power setting so ice had slowed the plane down to about 110 knots. However the plane handled well and the ice buildup soon stopped. With clear weather ahead it appeared to be a routine cross-country.

"At omni No. 1 I had difficulty obtaining a clear station passage. The to-from bar bounced down to the center but never did actually indicate 'from.' Well, must be the strong winds and slow airspeed I thought. By dead-reckoning we had passed the station when the to-from bar bounced to the center but I decided to get a good check at the next station.

But when it was tuned in, it was about 15 degrees off. With heavy gusty winds, and evidently having passed to one side of the first omni, there was no concern shown in finding the bearing that far off. Inbound to the station, several corrections were made in bracketing the inbound heading.

"Again there was an incomplete station passage signal. Something was definitely wrong with the omni receiver. Since it seemed reasonably reliable in headings, and with clear weather ahead, the election was made to continue rather than reverse course into the soup. The cross checks with the bird-dog had been almost fruitless.

"South of the next point, as predicted, we broke clear and cancelled our IFR flight plan. By checking the omni receiver with known locations of stations en route, it was found that the receiver indicator wandered in bearing and was completely unreliable in station passage.

"There are many conditions of weather in which the ARC-5 and the ARN-6 (ADF) are unreliable. In the above situation, without an ARC-5 or a reliable ARN-6, a heavy load of ice, very strong and gusty winds, and at night with 500 and 1, had I been inbound to my home base instead of outbound to clear weather, the circumstances would have added many gray hairs.

"My question is, why not establish VOR ground check procedures at all naval air stations, such as what NAS Anacostia now has, or at least work out an airborne check procedure similar to what CAA towers now use? I am certain that many other aviators have been in the position of taking off from an air station not having a VOR check procedure and then finding themselves in the soup on victor airways with an unreliable receiver.

HEADMOUSE

Have you a question or a technical comment concerning aviation safety? Send it in to Headmouse and he'll do his best to help.

MORE INFO ON COMPRESSOR STALLS

The November APPROACH carried a feature on "Compressor Stalls," which has provoked considerable favorable comment, often including with it supplementary discussions of a technical nature not generally available to the professional naval aviator or power plants man. Hence this package. . . .

Jet Indigestion

Sir:

"WHEN the plane's guns are fired, the muzzle blast can be scooped up by the intakes and set up disturbances that create a stall." On the surface, this appears to be a fairly obvious summary of the situation, with sure-fire procedures for getting away from the undesirable operation being needed to round out the problem solution.

Without suggesting the APPROACH reference to be an over-simplification, it is well to consider what happens when the turbojet engine swallows copious quantities of hot rocket/missile motor exhaust products. Right now, while relaxing in that easy chair, is the time to do the mulling, incidentally, as when you are airborne and the blast does go into the engine, things happen in a hurry. Consider the fine jet engines now powering our first line aircraft. They are well engineered, adequate for the job intended, and are getting better day by day. But the compressors are designed for optimum performance when the internal flow dynamics are properly matched. Operation is possible, of course, under less-than-optimum conditions (with some penalties) otherwise the thing would not be much good for driving airplanes. So what happens when your J-999 engine gulps up the exhaust products of, say, the Buster Boy missile?

Lots of things, actually, but one very important thing occurs—and fast! The compressor finds itself operating under a new set of conditions which are not supposed to be there at all and, unlike the classical bumblebee which doesn't know any better, the engine stops pushing and you stop flying. At this stage, you may have an unsavory combination of compressor stall, engine flameout, and afterburner blowout or any one or two of this trio of ill repute. And, we might add, if something is not done here, you are going to come down like a rock; airplane, missiles and all.

"A stall is a stall is a stall," you may wisely opine at this point, remembering those previously experienced, and this truism we would not presume to refute. But when the occurrence is coupled with the armament you carry and begins to bear on the efficiency of you and your aircraft as a potent weapon, it likens to boxing while wearing 48 ounce gloves. A series of soul-satisfying punches is unlikely to be delivered. The thing to be done, then, is to make it possible to operate our aircraft at extreme altitudes, fire such armament as we wish, and still stay up there. In doing this, let us go back to our engine compressor, which has just been handed a momentary diet of missile exhaust products. Under certain extreme conditions, this provender may be rejected by the engine in the form of some unhappy noises (stall) or, relatively, no noise at all (no fire). Either is likely to give the pilot an anxious moment or two and either, lasting any appreciable time, is guaranteed to contribute complications to mission completion.

Recognizing these factors, the Bureau of Aeronautics is developing:

(1) a device which will anticipate the uncommon situation about to happen as the "pickle" is pushed and arrange engine functions to accept the off-design conditions,

(2) improved and refined relight devices for the main engine and afterburners, should either go out for any reason, and

(3) even better engines.

Meanwhile, to continue to make those "E's" attainable and maintain a stable armament platform under you, the Bureau of Aeronautics has issued confidential speedletter serial 0651 of 17 January 1958 to the fleet commands relative to *interim procedures* for the F4D aircraft firing certain armaments. A similar development is underway for the F8U aircraft and will be made available quite soon as the details are worked out.

After item (1) of the preceding paragraph is incorporated, you should expect no mission-penalizing flameouts when employing your aircraft in a manner calculated to give little comfort to the enemy. Sooner or later, however, you will run into an aerodyamic version of Murphy's Law and conditions will be so coincidentally adverse that the fire will go out. At this moment, your confidence in, and the reliability of, the relight hardware must be of a high order. The relight systems currently in our operational aircraft render a very comfortable ratio of relights to duds when your where-abouts top-

side permit relightable conditions in the engine or afterburner.

In those instances wherein your altitude or maneuvering mitigates against a relight at the precise instant of flameout, it is *you* who must be the instrument of adjustment that allows relight conditions to be re-established. Having done this, the fire-off button may be punched with assurance. All this demands intimate knowledge, on your part, of the flameout procedures in the applicable handbooks; anything less is certain to net you considerable distress and may cost the Navy a megabuck or two.

By way of a recap, the presently installed engine/afterburner relight systems are dependable, effective, and most useful within the relight operational envelope. Witness the fact that it is standard procedure in some twin-engine jet aircraft to shut down one engine for a particular operation and later relight at will.

In fact, in some single engine aircraft squadrons, the standard operating procedure has been to shut down the engine for final glide to base, depending on a relight for the landing, thus assuring usable fuel for a possible wave-off and go-around. You *must*, on the other hand, marshall your relight assets wisely and not "fritter" away your auxiliary power attempting to obtain relights in an impossible environment where a relight is patently unobtainable.

In an effort to extend the envelope substantially, Bureau of Aeronautics is looking critically at promising new systems and devices which may be instrumental in reducing, or eliminating, the necessity for leaving combat station to get dependable, total re-ignition. Further, automatic operation is being carefully considered to the extent that the end point may be a system that will handle a flameout-relight cycle in a manner hardly noticeable to the pilot. Whatever the final configuration, you may be sure it will have the greatest attainable degree of reliability.

AER PP-32

High Speed Stall Phenomena

Sir:

Re "compressor stalls" Nov 1957 APPROACH. However, high speed compressor stall is the stall condition which occurs at high "referred" engine rotor speeds at which condition the engine operating line runs into the engine stall line, and can occur during acceleration to high power and/or operation of the engine at high powers. By "referred" engine rotor speed is meant the indicated speed corrected to static sea level standard day conditions. On a day where the ambient air temperature is below standard, referred engine rotor speed is well above the actual engine speed indicated on the tach; therefore, if the engine is operated at high power on cold days, high speed engine stall may possibly occur on certain engines with small high speed stall margin, as noted in your article.

The phenomenon of high speed stall is caused by the increased back pressure on the high pressure stages of the compressor due to the high level of burning in the combustor. The latter stages of the compressor go towards surge, being unable to pump the air to this higher pressure. This high combustor back pressure occurs because of the high expansion of the gases of combustion at the high engine thrust conditions, thereby causing choking at the turbine and/or exhaust nozzles and restricting the gas flow. "Choking" is defined as the expansion of gases through nozzles where the pressure drop is such that sonic velocity is reached and the mass flow of the gas becomes restricted.

The other type of stall condition which was not covered by your article involves stalling of the engine at very low thrust output. It has been noted above that in high speed stall the high stages of the compressor become stalled due to the high back pressure which they are pumping against. In the low speed stall condition, the low pressure stages are the villians. At low power operation of the engine, the burning and pressure levels of the combustor are so low that the flow of air from the high pressure stages of compressor actually experience a pressure drop in going into the diffuser and sonic velocity or "choking" is experienced here due to expansion into the combustor. This restriction of flow puts a road block on the low pressure stages and they end up trying to pump up against a stone wall and go into stall. This stall usually occurs in a range of RPM's at and somewhat above idle and is generally referred to as the "knee" or "hook" of the stall line. In order to have the engine operating line clear the "hook", it is necessary to use gadgetry or crutches in the engine. The most common device used is bleed valves which stay open and allow a portion of the airflow from the low pressure stages to be dumped overboard until the engine RPM has gone well above the hook. The bleed valves then close and allow the engine to accelerate or operate at steady state along the normal operating lines. Other devices used to get around the hook are variable inlet guide vanes and variable compressor stators.

Temperature has an opposite effect on the low speed stall occurrences than it does on a high speed stall. Ambient air temperature above normal produces a lower referred engine RPM which may and has on certain engines thrown the engine operating line with bleed valves closed back down into the hook and therefore caused stall. This low speed stall may be experienced on acceleration, deceleration, or steady state operation at low thrust conditions where an increase in airplane air speed or decrease in altitude may increase the compressor inlet temperature sufficiently to lower the referred engine speed down into the hook. Most engines now have corrected speed type bleed valves, variable inlet guide vanes, and/or rotating stators with control which automatically compensate for these temperature changes in the functioning of these devices. However, one first line fighter engine, the J71-A-2, does not at this time have a temperature biased system; therefore, it will be noted that certain restrictions have been put on this engine relative to altitudes and air speeds which can be flown at minimum thrust conditions. Virtually, all modern high compressor pressure ratio engines have this hook in the stall line and incorporate one of the above described crutches.

Certain engines on acceleration or deceleration may be able to bull their way through these types of stalls with no harmful effects. However, the occurrences of this low speed stall on certain engines will require that the power lever be retarded to idle and the engine RPM and temperatures allowed to stabilize prior to attempting acceleration of the engine again. In extreme cases the pilot may be required to shut the engine down and go through the air start procedure to overcome the effects of the stall. Appropriate instructions have been issued to the fleet for specific engines where this stall has been known to occur. This low speed stall will normally not be encountered during aircraft maneuvering but encountered only at low cruise operation and during decelerations or accelerations in the low thrust range.

R. SHAFER
Power Plant Division, BuAer •

Ye Approach Alman

4 Today is Sunday—don't send your children to church, TAKE them.	5 Thunderstorms can be seen on radar, but not vice versa.	6 If you **MUST** penetrate, t on pitot heat NOW
11 When a thunderstorm transitions from the cumulus stage to the mature stage, it begins to rain. Real hard.	12 Omaha is the center of nocturnal thunderstorms, but that's in Nebraska.	13 Turn up cockpit lights f bright (white) before ente ing a tstm, to somewh counteract the blinding e fects of the lightning.
18 The rain in Spain is mainly on the plain.	19 There occur about 44,000 thunderstorms per day on the earth, and the lightning energy is equivalent to a *continuous* 268,000,000 horsepower.	20 Whoops! There's still tim to reel in that trailing wir antenna!
25 Summer afternoon thunderstorms occur when cool, onshore-blowing air is heated by the land, becomes unstable, forms cumulus. In some areas they're predictable enough so that schedules can be planned around them.	26 Ever stop to think that thunder is the least worrisome part of thunderstorms? The gusts and drafts can wrench you, the lightning can ruin your radio and temporarily blind you, the rain can freeze in your pitot or carb, but the only thing thunder can do is wake the baby.	27 Of course the loop ante will work better than th ADF in the vicinity thunderstorms, but why?

"Some people are weather-wise, but most people are otherwise."
Benj. Franklin

Everyone talks about the weather, but nobody listens."
Melvin Koznowski

...anack for May

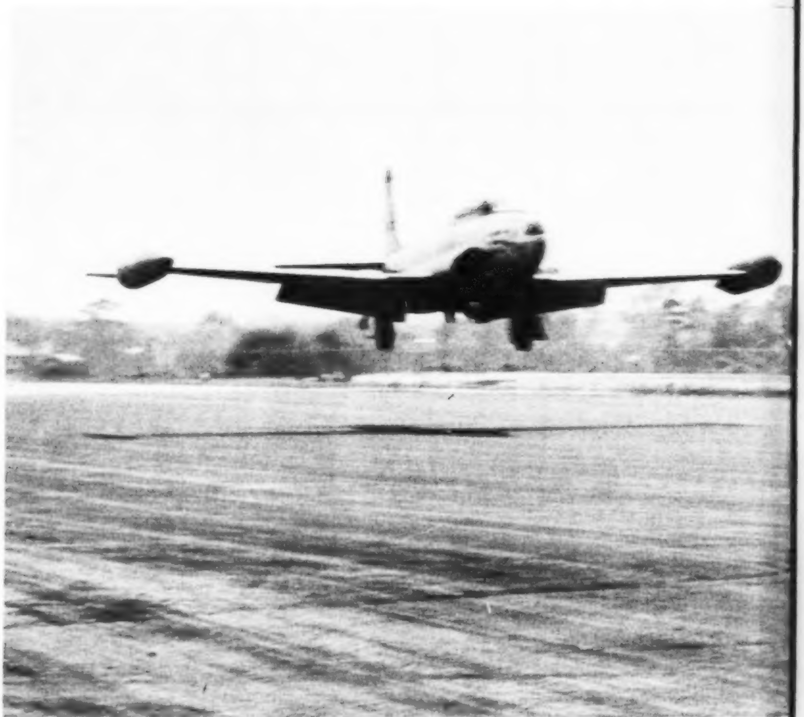
(Excluding signs of the zodiac, phases of the moon, good fishing days, and much other useful information.)

For aviators, balloonists, Weekend Warriors, astronauts and rocketeers. Compiled and published in the interest of aviation safety.

Based on intensive research, observation, old wives' tales, and a casual perusal of "Thunderstorms I Have Known" by C. U. Nimbus.

		1 People who have flown through thunderstorms don't fly through thunderstorms.	2 Florida has more thunderstorms than anyplace in the US, but the fishing and water-skiing are excellent.	3 Thunderstorms, like penitentiaries, are composed of cells.
...penetrate, t... ...NOW	Orographic thunderstorms occur on the windward side of mountains, and therefore often conceal some mighty hard, jagged rocks.	8 Jet engines are subject to compressor stall in thunderstorms.	9 Of course, they're also subject to compressor stall at other times.	"Ain't nothin' to worry 'bout," said Beulah as she stood under the tall, lone tree on a hilltop during a thunderstorm. She shore looked purty when they closed the lid, so calm and peaceful and still.
...t lights f... ...before ent... ...o somewh... ...blinding ... ...htning.	If you eject in a tstm your baro chute opener will pop your chute right smack in the middle of some mighty nasty vertical drafts—you might keep right on going UP. And you'll get wet.	And just what are you doing flying through a tstm anyway? If you turned on your bird-dog it would not only point out the storm but the other end of the needle would point out the best way to go.	An old wives' tale, carried along by its own momentum, says vertical lightning will be observed at the front of a tstm, and horizontal lightning is seen at the rear. No old wives available for confirmation.	Today is Armed Forces Day—curb that urge; the best advertisement the Armed Forces could have is to have not one solitary accident today. Going around 'em instead of through 'em? Thanks.
...still tim... ...ailing wi...	The region most frequently (but not exclusively) subject to lightning discharges is the 20°F to 40°F temperature layer.	Experience-based advice from an F9F-6 thunderstorm researcher: "I turned up full cockpit heat to reduce canopy fogging, and also because when you're scared you shake—and my bones just don't shake quite so hard in a warm cockpit as in a cold one."	Some pilots advise, where practicable, filing VFR out of a field with thunderstorms around, so they can dodge 'em, then filing IFR when clear of tstms. Better than finding your first outbound IFR reporting point is right in the middle of the grand-daddiest cumulo-bumpus of 'em all.	Thunderstorms rarely last long nor do they hang around in one spot—is it REALLY important that you take off into the teeth of one *now*, when 20 or 30 minutes chatting with the pretty Wave will give you CAVU?
...oop ante... ...r than ... ...vicinity ... ...out why?	Here it is near the end of the month and we haven't said anything about hurricanes, monsoons or typhoons yet — they're plotted and tracked for you, but thunderstorms can develop pretty quickly right in your own back yard.	"It is interesting to speculate that the coalescence of droplets into drops is important in the life cycle of a thunderstorm."—*The Thunderstorm*, U.S. Department of Commerce (Naval Aeronautical Pub. 50-1B 508).	"Into every life a little rain must fall." Another old wives' tale. Old wives don't know that *takusan* rain gushes out of a thunderstorm, that there's snow in 'em above 20 thou, and ice crystals up around 35 thou. But rain is the only thing that gets down to your Sunday picnic.	Just one little item about THUNDERSTORMS. They're predictable, even by old wives. For your next APM, why not get the Aerologist's Apprentice to give you a rundown on what you can expect in your local area next month. Thunderstorm-wise, that is.

TRUTH AND CONSEQUENCES



The second landing attempt was just like the first, except by this time the crash crews were standing by!

A DIGEST OF SIGNIFICANT AIRCRAFT ACCIDENTS

May 1958

DIDN'T ASK—The TV-2 filed IFR for an all-weather NAS (didn't ask for GCA on his DD 175), and the flight was uneventful except for a stubborn elevator trim which required several jogs each way before it turned to.

Arrived over the destination station with 700 scattered, 1500 broken, 5000 solid, 4 miles in rain & fog (didn't ask for GCA) and was cleared for penetration. Just prior to low station pilot was advised that field visibility had deteriorated to one mile in rain (didn't ask for GCA). After breaking out at 700′ pilot was cleared for a low visibility approach to a runway with a quartering tail wind (didn't ask for GCA, didn't object to downwind landing).

Touched down hard and fast on the nosewheel in first 1000′, porpoised and took a voluntary wave-off. Coming around, altitude was 350-400′ in and out of low clouds (didn't ask for GCA). Second landing, same like first, except now the crash crews were standing by.

Third landing, same like first and second, except now people on deck began to worry about how many more nosewheel-first poundings the T-bird would take. Pilot was advised to stay down if at all possible on the next attempt. Pilot complied and landed smoothly. Pilot said, "It was my intention to have a short straightaway because of the extremely poor visibility forward through the fogged windscreen, so a fairly wrapped-up approach was made."

The board concluded that the pilot erred in that he had poor speed control during approach and failed to flare properly. They also blamed reduced visibility caused by heavy rain and fogged windshield.

The board recommended that "A thorough review of the landing characteristics of the TV type aircraft plus constant practice under all conditions appear to be the solution to accidents of this type".

The board didn't say a thing about GCA, about wrapping it up around downwind at 350-400 feet in and out of clouds in a jet aircraft, nor about the tower assigning a downwind runway. Nor did subsequent endorsements. The pilot probably still feels that the only thing he did wrong was to land fast and without flaring. A look at most jet aviators' log books will reveal that they fly much *less* actual instruments percentage-wise than their prop counterparts. All they get on the gauges is a climb-out and a penetration, usually. But these are the two critical phases of any flight.

Under *any* conditions where weather at destination is a factor, the pilot should assure himself that landing aids (GCA or ASR) are available before departure, specifically request them on his DD 175, and check that the aids are available when he calls for further clearance *at least* ten minutes from destination. If he can't assure himself that he has done these things, plus working out a plan for a suitable alternate, then he hasn't done everything to assure a safe flight.

Upon examination the aircraft was found to have a broken nosewheel and cracks in the vertical and horizontal legs of the upper rear starboard wing span cap. The bill: $21,726.

BRAVO—With 361 total hours and 1.2 hours in the F9F-8B, the pilot was making his second takeoff in model. He pulled onto the runway and the chase plane moved into a wing position. After a full-power check and a "thumbs-up" from the chase pilot, the leading jet released brakes and the two eight bakers began rolling.

Continued from preceding page

About 1500 feet later, at 80 knots or so, the junior pilot heard an explosion and experienced a sudden loss of power. Chase immediately transmitted "Abort, you're on fire." The pilot applied brakes, shut down the engine, opened the canopy and steered the aircraft off the runway. "When it was nearly stopped," said the pilot, I unlocked my lap belt, and with the parachute on, climbed on the left wing and jumped down. I then moved about 200 feet away and sat down." The aircraft was burning intensely.

After telling the student to abort, the instructor told the tower the student was on fire and aborting, and then he continued his takeoff.

A Master Sergeant standing in front of the station crash truck barn heard yells about an aircraft on fire and saw the F9F-8B. He jumped into an 0-6 (CO_2 truck) and accompanied by an MB-1 truck started for the fire. By the time the chase pilot was airborne and had turned to come back over the field the aborted jet was covered with foam. The sergeant said "We used the ground sweep and boom to knock down the bulk of the fire and bayonet nozzles on persistent interior fire."

By the actions of the crash crew only overhaul damage (estimated cost 37 thousand dollars) was sustained.

General opinion was that this was one situation where, after the emergency occured, everything happened without a hitch; correct procedures, coolness and clear thinking were evident. The squadron skipper wrote that considering the pilot's rather limited experience . . . he displayed exceptional professional skill and presence of mind in coping with the emergency.

STRAPPED—A pilot had made three carrier landings in the F11F some nine weeks previously and was attempting to complete qualification. His first pass was a touch-and-go. On the second pass, hook down, the aircraft settled in the groove. A waveoff was given and the pilot added military power. The nose was rotated so that the F11F was unable to gain altitude.

An in-flight engagement was made with the No. 1 wire which slammed the plane to the deck, nosewheel-first, fully compressing the nose strut. The pilot suffered a severe back strain as a result of the jolt. He stated his shoulder straps were not uncomfortably tight but motion pictures showed that the shoulder harness was not cinched up as securely as he thought.

DEMONSTRATION — During demonstration of in-flight engine feathering of an S2F, the port engine unfeathered successfully but failed to start. The engine fuel and oil shut-off switches had failed to return to ON position, when the switch-guard-covers had been closed.

Zoom for Room

PILOTS must not be lulled into believing that because they have an automatic lap belt separator and automatic parachute opener, they are assured of safety when ejecting at or below 1000 feet. There is no acceptable substitute for altitude when the face curtain is pulled.

Some squadrons have reportedly established 500 feet as the minimum safe-ejection altitude, with automatic equipment, when attempting a flameout approach. Based on mathematical calculations and sequence times they have assumed that the decision to eject during the approach can be delayed until the pilot is sure he is incapable of making the field. BUT in actuality this fails to consider variances in pilot-seat separation and chute deployment, where vital seconds are lost.

Although it is true that automatic equipment insures the ejectee of more rapid parachute deployment than could possibly be achieved manually, *500 feet has not been sufficient to eject* successfully with present equipment!

It becomes a fatal error in judgment to postpone an inevitable ejection. Accident data statistics show that with present equipment, ejections become increasingly hazardous as the altitude decreases below 2000 feet. Ejections below 1000 feet continue to be fatal despite automatic equipment.

Two major ways in which ejection safety may be improved immediately are: (1) keep the aircraft at a safe altitude at all times except in unavoidable circumstances such as landing/takeoff, and (2) establish 1200 feet as a minimum for elective ejections, based on the 1957 Navy ejection record.

The design and improvement of the ground level capabilities of ejection equipment is receiving most urgent attention; but with equipment now in use, if at all possible, establish a positive rate of climb, "zoom" to convert excess speed to altitude before ejecting (See APPROACH Jan '57 and poster No. B22 PI 956).

The engine started after switches were set to full ON. Shortly afterward the pilot observed high oil temperature and low oil pressure. The engine was feathered and secured. A normal single-engine approach and landing was made. Metal particles were found in oil strainer.

Damage was probably incurred while engine was windmilling with oil supply turned OFF.

Pilots should manually actuate toggle switches and not depend on the closing of the switch-cover-guards to properly position switches.

RUNWAY OBSTRUCTION — Recently an F2H-3 collided with an unlighted landing mirror receiving major overhaul damage. The pilot was uninjured. He had requested and received instructions to land on the duty runway. At about 2500 feet from the approach end of the runway, while at an airspeed of 80 knots, the aircraft collided with the portable field landing mirror. The mirror was 25 feet inside the runway lights and unlighted and unmarked. The accident occurred during the hours of darkness.

Primary error was assigned to tower personnel.

Secondary error was assigned to operations administrative personnel. Knowledge of the fouled runway was not passed to key operations and tower personnel.

It was recommended:

1. Tower personnel insure that duty runways are clear. Runways should be inspected visually prior to hours of darkness for any possible hazards.

2. When portable field landing mirrors cannot be moved clear of the duty runway, it is recommended that they be lighted with obstruction lights.

ASSUME NOTHING — Involved was an F6F-6 aircraft which was leading a two plane section on a cross-country flight.

The flight leader entered the break and lowered his landing gear with no difficulty; the second aircraft experienced an unsafe indication on one main gear when his landing gear was lowered. The pilot re-cycled his gear and was still receiving an unsafe indication. He called the flight leader and requested him to take a waveoff and check his gear. The flight leader executed a wave-off and *retracted* his gear leaving the flaps extended. He checked the wingman's gear and reported it appeared down and locked.

After utilizing the emergency gear extension procedures, the wingman called for and received permission to fall in behind three other aircraft at the break for a landing. The lead aircraft now following his wingman made no further transmission but proceeded to fall in behind the other aircraft for landing. Possibly due to this abnormal entry, the gear was not lowered again; neither the Runway Control Officer nor the Wheels Watch attempted to wave off the second aircraft because they did not know his intentions. The aircraft was landed WHEELS UP.

Recommendation of the AAR Board included increased emphasis to all pilots regarding the added accident potential involved when normal habits of flying are broken, thereby requiring increased emphasis on the use of the landing check-off list, and that the Tower Operator and Runway Control Officer be alert to the unusual and to assume nothing.

1. Name six signalling devices in the Mk-IV raft and their approximate range under good conditions.

2. When someone is injured, what two conditions must be treated first; and how?

3. Where is the first aid kit on your aircraft?

4. Who is responsible for attaching the Mk-IV life raft to his person after ditching?

5. How much water will a solar still make during a four day period with a constant overcast?

For the answers turn to page 37.

FAM

A thought-provoking accident stimulated this discussion about training in conventional gear vs. tricycle geared aircraft.

THE STUDENT pilot had 6.6 hours in the AD and had made 20 landings, of which 17 were touch-and-go. On the second period of touch-and-go landings the instructor-familiarization officer observed the student making a satisfactory touchdown and initial takeoff roll. *Then it happened.*

After commencing the takeoff run, the tail came up with good directional control. As the plane became airborne, its left wing dropped slightly and it started to swerve to the left. The pilot appeared to reduce his power, the wings were leveled and the plane was realigned with the runway. It settled back to the ground.

Following that there was a sudden application of a great deal of power. The left wing went down rapidly and an immediate swerve to the left developed. The AD got airborne again to an altitude of 12 to 15 feet and followed a curving path to the left in a 20-to-25 degree left wing down, slightly nose-low attitude. There was no apparent attempt to reduce the high power setting.

The AD crossed the left side of the runway in this curved path and continued for a 100 yards where the left tip (with *full down* aileron) hit the ground. With the port wing acting as a pivot the port wheel was forced onto the ground. Tail still high, the prop began to "harrow" the dirt then the engine struck the ground violently and a cartwheeling process to the right began.

The right wing sheared at the fold joint allowing the fuselage to rotate around on the starboard stub and starboard elevator tip. The cockpit was quite close to the ground and in as near an inverted position as was reached. The pilot intentionally tripped the safety belt and dropped out on to the ground.

Continuing on without the pilot, *leaving him lying uninjured on the ground* the "aircraft" reversed itself and slid tail first for 50 yards, shedding the engine, cowling and starboard main gear. The fuselage, cracked aft of the crew's door during the cartwheel, broke and the tail folded back onto the forward section. Explosion and fire completely gutted the wreckage.

Immediate interrogation of the pilot by the fam officer, and shortly thereafter by the investigation officers, produced material generally paralleling that included in the pilot's statement with one important exception: In both examinations — conducted separately — the pilot stated that in addition to the lack of any right rudder trim, he had not used any right rudder at all during the period following the sudden application of power, *but had attempted to control the aircraft and recover from the swerve with continued full power and full right stick.*

The following is taken from the accident board's analysis:

Analysis of this accident reveals that the pilot failed to make any adequate correction for the high torque effects which are present during takeoff in an AD aircraft. Furthermore, once involved in a high, uncontrolled torquing situation, absolutely nothing, except application of full right stick, was even attempted to stop the turn, level the wings, and reduce the torque.*

These then, were the final errors which resulted in the loss of directional control and the eventual cartwheel and subsequent destruction of the aircraft. But as grave as are these actual acts of commission, the act of omission which set the stage are a source much more dangerous and a matter of grave concern to organizations training pilots to fly high powered, single reciprocating engine aircraft.

It would seem proper, therefore, to examine into the "why" of the acts of omission. Why does a student pilot "jam" on full power abruptly and suddenly? Why does he attempt to takeoff with little or no right rudder? Why does he persist in maintaining full power when a bad swerve to the left develops? A torque roll at altitude, a detailed lecture on an accident which was identical to this one in every way, literally hours of lecture time on torque and its effects, and the death of a student pilot just two weeks before from the results of a torque roll at low altitude have failed to impress this pilot? Why? He is not stupid and his flight performance in basic training has been quite satisfactory.

Obviously, then there must be one or more facets of his aeronautical background that have been neglected. Except for the fact that his performance has

NASC Comment: when the pilot used *only* aileron to pick up his wing after the sudden application of high power at low airspeed and a high angle of attack, he guaranteed the catastrophe which ensued. This merits a little further discussion:

1) The aircraft was in a near-stalled attitude as the power was added;

2) A torque roll is slow speed phenonema and is experienced in the airspeed range where flaps are normally extended. Flaps decrease the lateral stability of the aircraft by causing a shift in the center of

resulted in a major aircraft accident, all of the foregoing *whys*—albeit, to a lesser degree in most cases—are asked over and over and over again of practically every student now arriving from the basic training command. There has always been a certain amount of disregard for proper engine operation, but this has been easily corrected since, until recently, there has been evident a basic understanding of torque and power and their relation to control of the aircraft.

This recent decline in apparent understanding of engine performance, use, and its relation to the performance of the aircraft has paralleled the appearance of T-28 and T-34 trained students. It seems to have become most apparent in those students having their experience solely in the nose-wheeled T-28 and T-34.

Review of the log books of students trained solely in the SNJ as compared with the logs of the students having only T-34 and T-28 time reveals that while the total flight time is about the same, the average SNJ solo time is 86.1 hours as compared to an average total nose wheel solo time of 64.7 hours. A difference of 21.4 hours or 33 per cent decrease. This is a considerable disparity. It also presents a very sobering picture of a student pilot with 64.7 solo hours, none of it in a three-point attitude aircraft, strapped into a seven and one-half ton airplane with 2700 horsepower.

While normally 21.4 hours is not very much time, however, when it entails a 33 per cent increase in one's total solo experience, it represents a very important segment. It can well be likened to the development that occurs in a child between his fifteenth and eighteenth birthdays. This immature solo condition can well explain the apparent lack of comprehension of the very brutal and violent aspects of uncontrolled torque, the instructors' efforts toward the student's enlightenment notwithstanding.

There is one attitude which all students, no matter what aircraft they flew in basic training, have. It is that there is only one cure for a bad bounce, a bad swerve, a settle, slipstream, etc., viz: full throttle and go around, *right now*. It serves as a panacea for all landing ills and is deeply ingrained; it is followed blindly and is one of the most difficult habits to break during fam stage. The fact that the airplane is angling badly across the runway on takeoff, that the wings are not level at the time of wave off, or that the aircraft has bounced badly, is very slow and nose high are ignored; full power is their answer, "let's get out of here."

We now find some reasons for Ensign ________'s actions. Lack of familiarity in the three point attitude aircraft; slavish adherence to the propositions that "full power will get me out of anything"; insufficient grounding in the importance of proper engine operations, and as a result of this last, inability to grasp, to believe completely, that *everything* the instructor said about torque *could* happen to the student.

Analysis of the FO's attempts to indoctrinate and train Ensign ________ indicates that he was thorough and conscientious in his efforts.

There are three things that Ensign ___________ might have done to prevent this accident:

a. Applied his takeoff power smoothly and gradually. This would have caused a gradual increase in the torque effect and would have avoided the violent left swerve and left wing down rolling motion.

b. Used right rudder — any amount would have helped, and the proper amount, of course, would have stopped the swerve.

c. Reduced the amount of power being carried. The aircraft was already airborne and the manifold pressure could have been reduced as low as 28 to 30 inches without endangering the aircraft and would have eliminated the uncontrollable aspects of the torque.

That Ensign ________ escaped unhurt is amazing. Actually, his decision to abandon the aircraft was based upon a mistake in that the aircraft was most definitely still moving in a completely unpredictable manner. It is doubtful that he would have survived the violence of the cartwheel had he attempted to leave earlier and more than likely, had he waited any longer, he would have been unable to get out until the fuselage stopped—by which time the explosion and inferno that followed would have trapped him.

lift of each wing toward the centerline of the plane. The airplane is more susceptible to rolling in this configuration;

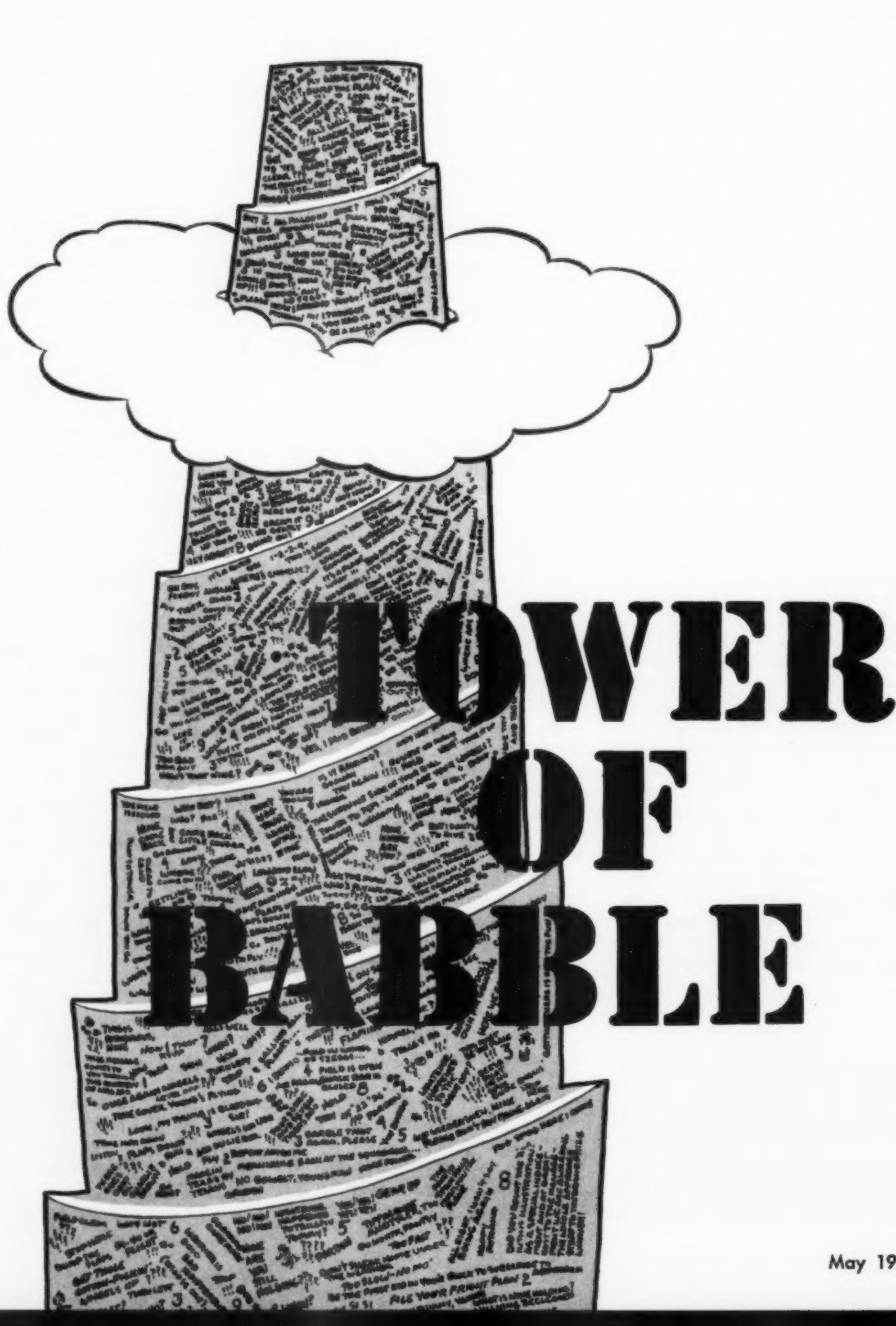
3) Any sudden downward motion of the left wing, or upward path of the free-stream air reaching it, may cause it to stall while the right wing is still producing lift.

4) The sudden increase in power to a propeller rotating to the right makes the airplane try to rotate to the left—Newton's action-reaction law. As the left wing tries to go down, it immediately develops a higher angle of attack, and, short of stalling out, the increased angle of attack counteracts the tendence to roll. If the stall angle of attack is exceeded, a rapid roll towards the stalled left wing develops.

5) The increased RPM provides a cork-screwing airflow over the wings and vertical stabilizer. This twisting airflow increases the angle of attack on the left wing, decreases it on the right, but also develops lift on the starboard side of the vertical stabilizer which forces the nose of the plane to the left.

6) Even if the wing is not stalled, lowering of the left aileron increases the camber for that portion of the wing with the same effect as a radically increasing angle of attack, and the section of the wing forward of the aileron can be stalled.

All of the above can happen in a torque roll, but by smooth application of power coordinated use of right rudder and limited use of ailerons, you can keep out of this fatality-producing situation.



TOWER OF BABBLE

THE *Beech* was just turning onto final, gear down, flaps 30, props full forward, when the tower said, "Hold clear, nine."

"Hold clear? Guess he wants us to wave off," grumbled the pilot, "okay dump the flaps," and he reached for the throttles. A moment later the air in the cockpit was blue with four-letter words as the pilot lunged for the flap lever and raised them from the 45 degree down position that the copilot had placed them in.

"What in $#%@#? did you lower the flaps for? I said to *dump* the flaps, don't you know that means to get rid of 'em?"

Before the nervously shaken copilot could reply the tower called to ask why they had taken a waveoff. In a few more explanatory transmissions it developed that the tower's "Hold clear, nine" was intended for an R4Y holding off the runway—seems he was starting to inch up onto the runway. Yep, both the *Beech* and the R4Y were number nine.

The mythical tower of Babel had nothing on this situation, nor on many other similar situations that take place in naval aviation nearly every flying day. The confusion that exists in cockpits, in control towers, and on the line is astounding—and it's astounding that more accidents don't happen because of wrong or non-standard terminology and signals.

The confusion in the above case originated in the tower, *but towers aren't the only source of conflicting words and instructions* that can end in disaster. In fact, it's often *no* words rather than words that create a hazardous situation.

There are three underlying causes for the misinterpretations that arise out of situations like the one described above.

First is the English language, which is littered with pitfalls in its written and spoken forms. Even under ideal conditions "go" can sound like "no"; and "gear" sounds like "clear," "prop" can be interpreted as "stop."

Second bugaboo is mathematical probability—says that if you say "nine" around a busy airfield often enough, there's bound to come a time when *two* nines will answer up.

And the third offender, the only correctible one, is people. Ever since "Hell's Angels" a great preponderance of the people who work in, on or around airplanes seem to talk the terse, grade-B movie "flying talk." It's a normal, human trait that you can't blame people for, to talk the "jargon of the trade."

But individuality makes us invent our own jargon, and some of it just doesn't get around to the right people until panic button time. Say now, there's one—Panic Button—bet you can find a lad who'll look all over the cockpit for one.

Well, what would YOU do if you had half flaps and your pilot told you to "Dump 'em"? The copilot in this story had heard the phrase before, but to him "dump" was synonymous with "down" and "lower." His pilot insisted that "dump" meant the same as "jettison," "get rid of," "do away with," "spill."

You can probably think of several pet phrases right now that are perfectly clear to your crew, but what about the young lad who just offered to be a "warm body" for you so you could run a *Beech* up to Norfolk or North Island for some parts? Never flew with you before, but this is daylight VFR and he's just sitting there to run the wobble pump, . . . And then you make that backward motion over the throttles as you go to raise the wheels, so he'll ease off to 30" for you. Oh, you didn't think he'd pull them all the way back on you? Well, there's a pilot who now touches up the gray hair that was brought about by a lad who did just that.

One of our pet peeves turned into a near-accident not long ago—we grumble and growl when towers ask us to "expedite this" and "expedite that" because we like to expedite through the clear, blue air but we rebel at being rushed into a hasty ground check or takeoff.

So, when the tower asked a lined-up aircraft to "expedite clearing the runway," they weren't sure whether they were supposed to hurry up and take off or hurry up and taxi back off the duty runway. The tower operator knew what *he* wanted, but the resultant dangerous confusion arose because the pilot responded with his own perfectly logical interpretation of "clearing the runway."

And then there was the many-thousands-of-hours pilot who saw his student was going to fly right down into the runway so he said "break it" . . . pause . . . "*break it*" . . . BREAK IT—NEVER MIND, I'VE GOT IT . . . #$%#$#%. Turned out the youngster was braking as hard as he could, even though he didn't understand why the instructor wanted the brakes on while still in the air . . . "break it" was flying talk that he'd heard used in a recruiting movie, but he hadn't yet reached the point of learning what to break. No one had told him.

In one P2V squadron, they had to convince several radar opera-

Continued from preceding page

tors to stop asking for permission to "fire up the radar" after one pilot heard only the two words "fire" and "radar". This same squadron was the one in which a pilot was saying, ". . . in case you have to *bail out*. . . ." when a man put his headphones on, heard only the last two words, and was halfway out the hatch before someone grabbed his collar. Seems he had a harness on but no chute.

While pilots are far more guilty of creating confusing babble than others, we've heard of a near classic by a tower operator who tells R4Ds approaching the ramp to "go to button two." If you stop and ask him why you should switch to channel two at that point, he'll come up and tell you that he wants you to head for main gear turntable number two, and what are you confused about sir? We call them buttons here, see?

Then there was the FJ-3 making a mirror approach to a carrier. LSO was monitoring the approach and called a reassuring "all the way down" to the pilot. Pilot interpreted this as "bring it down" and nosed over, dropped his right wing crossing the fantail and sheared the right main gear as he picked up No. 5 wire. LSOs must remember that their words, if not clearly understood in that critical stage of flight, can turn a good pass into a fantail-buster.

An F9F-8P ran off the end of the runway when he aborted his takeoff upon hearing an urgent "Ten, hold it up." Tower wanted another aircraft, also No. 10, to stop taxiing. Scratch one main gear.

And the old handy thumbs-up-signal! Boy, that can sure get airplanes and people into predicaments in a hurry! Thumbs-up has come to mean just about everything except that you have no thumb. It's used to mean "up," "roger, I understand you," "yes, I hear them screaming at us," "all's well," "climb," "look up there," and "look, my thumb is bleeding." Unless you're accustomed to what thumbs-up means from a certain individual, you can't depend on it much anymore.

While it doesn't happen very often, a Safety Council recently pointed out the potential confusion that existed in their area when a squadron partly transitioned into new aircraft had several new and several old aircraft with the same side numbers. This not only created difficulty in communications, it also resulted in a "who's on third?" situation when a duty officer became anxious about No. 10 which was overdue, and was reassured by a helpful but uninformed POOW that "No. 10 is in the barn, sir." The other No. 10 was overdue.

While conducting some undercover research on the subject of misleading instructions and words, we ran into a dilly without even looking for it. Taxiing along one recent moonless night we asked the copilot, "Do I turn left here?" and he immediately answered up with a laconic, "Right." With our thumbprints still on his throat, he then amplified his meaning—that's right (oops, that's *correct*), he wanted us to turn left.

Human response to stimulus has an important relationship to commands, especially in moments of mental stress. Take the case of the student who was having trouble in the air—the chase pilot said, "pull up!", and the pilot immediately ejected. He insisted, later, that he had heard the words "bail out", and the chase pilot insisted he didn't say them. What most likely happened here was that the student was ready to bail out, he was "primed" to hear the command just as you're primed to see the traffic light turn green after it changes from red to amber. And, when he heard the terse phrase, same syllables, same tone of urgency, he heard what he was *ex-*

pecting to hear and out he went.

Pilots who are in a position to offer advice to someone in an emergency situation might keep this in mind and, where possible, offer their advice in a calm, reassuring sentence rather than a short, harsh command that might "trigger off" an undesired response. Think of what you do when the neighbor's not-very-friendly pooch snarls in your path— you don't say, "Nice dog" in a harsh tone, that would trigger him off. You speak calmly and soothingly, even if you call him a no-good-mangy cur, because he responds to voice tone stimuli better than to words. Try it.

How far can we go in eliminating Cockpit Confusion? Theoretically, we could eliminate it completely if everyone said just what he meant in plain, *standard* language.

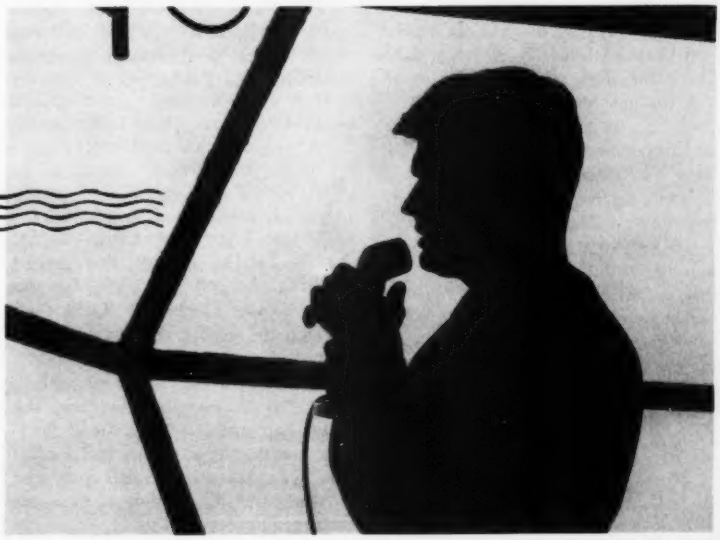
But we're not automatons and we rebel sometimes at attempts to make us say a standard, canned phrase. Listen to some traffic turning base next time you're in the tower and you'll hear much originality . . . "gear down and in the green" . . . "down and locked" . . . "gear check complete" . . . "gear down and apparently locked" (no gambler, he) . . . "three in the green, pressure up" . . . "turning base, rollers and draggers in place" (hepcat, this one) . . . and occasionally an unimaginative conformist who says "turning base, gear down and locked".

Transferring actual control between pilots is another place where words and sign language break down frequently. Copilot puts his hands on the yoke momentarily, pilot says "got it?" and the machine bumbles along its own because the copilot thought the pilot said "got it." Pretty hard to go wrong if you do it the old corny way—rock the wheel, raise both hands, and watch for the other fellow to pat his head. Would completely eliminate one standard phrase—"but I thought *you* had it".

Let's get off your back and the tower operators' and take a look at the plane captains out on the line. Many of them have never had "Taxi Sense" as required reading, and their signaling gyrations would delight even the most avid ballet enthusiast. Here again originality is the bug, for who wants to guide a zillion dollar flybird into the chocks with corny old-fashioned signals when a dash of flavor will lighten the hearts of weary pilots? So we get NAS Nijinskys who flail the air with dramatic waving of arms while weary pilots groan or, worse yet, follow their signals right into an open gas pit. Plane captains and taxi directors, *unite*! Taxi signals were made standard for a serious purpose, and OpNav Inst 3710.7A directs that they be used as adopted.

No, we probably won't ever standardize terminology or hand signals to an ultimate degree. But we can add an extra dash of common sense to some of the jargon and mystical hand-wavings that take place in cockpits and on the line. Like briefing a copilot whom you haven't flown with, for example, and telling him that after takeoff *you'll* raise the wheels and *he's* to bring back the throttle *to 30"* when you turn them loose.

And like using standard, Navy-wide accepted terminology that leaves no doubt. IFR means Instrument Flight Rules, and if you start referring to Inflight Refueling as IFR, someone's gonna be embarrassed! Same as TOT—what do *you* call it takeoff time, time over target, turbine outlet temperature? Does your squadron PIO get mistaken for pilot induced oscillation?



Whether you're a one-seater jet jockey or a *Connie* copilot, a tower controller or a substitute acting plane captain, a little common sense in the use of english—both the queen's english and body english, will go a long way toward eliminating that helpless feeling experienced by a senior pilot in an allied service who elected to take a waveoff and called for "takeoff-power". Yep, his flight engineer took off power—all of it.

NOTES FROM YOUR **flight surgeon**

Right Was Wrong

They were on final—At 300 feet visibility improved to 2 miles and the runway was in sight. They reported position and understood the tower to say "cleared to land 13R." An aircraft was on the end of the runway about to turn into position for take-off. It rapidly cleared the end of the runway and the landing proceeded.

Later it turned out the clearance had been to land on runway 13*L*. The pilot explains that because of the plane's weight and the fact that 13L is the short runway he had never been told to use it. "We were expecting to hear reference to 13R, so because of this conditioned thinking we "heard" the word right regardless of what was actually said."

This points up the need for ever-increasing alertness and the need for exact attention to every phase of approach and landing. *ALPA Technical Talk for Pilots.*

Please see "Tower of Babble," page 32.—Ed.

Ring Loss

"WHEN the plane was at 18,000 feet and near 400 knots heading straight down I decided to eject."

The ejection and chute opening were routine, though the pilot noticed that the force of the chute opening was greater than the force of the ejection.

The contact with the ground was not hard, though the pilot reports he fell backwards, and "the chute did not drag me at all. It was entangled in cactus."

He used one of his four flares to build a fire, and one to signal a plane he heard.

The other two did not work, because the rings were rusted and broke when he pulled them. . .

Where possible, riggers keep check on such items as flare rings, but in any case, the pilot should also check all of his own safety equipment at frequent intervals.

Fortunately helicopter rescue came fairly soon—the pilot suffered only a few bruises—and puncture wounds from the cactus.

Not Guilty

AFTER a loss of power, vibration, fire warning lights, smoke in the cockpit and smoke trailing behind the F9F-5, the pilot finally ejected at 4,000 feet, though he had first considered a flameout approach.

Yet the flight surgeon reports that "as is usually the case, the pilot had guilt feelings about leaving the plane; after he had landed and was picked up he still wondered if he could have made a flameout approach successfully. . . . Our only criticism of the pilot's procedure is that he let his airplane get too low before he ejected. Four thousand feet above terrain is adequate room for ejection if everything goes all right, but with indications of fire, cockpit full of smoke, the loss of control of the aircraft and the various factors involved, it seems that the pilot should have not even considered an attempt to set up for a flameout, but should have ejected at 10,000 to 12,000 feet, when his cockpit became filled with smoke.

The only injury was a scraped elbow sustained in landing.

If any aviators doubt the Navy's sincerity in encouraging ejections when there is such justification or reasonable question in the pilot's mind, please see OpNav Inst. 3750.12, 10 Dec '56—Ed

Crash Cause

THE PILOT of an F9F-4 was killed in a crash which occurred a quarter-hour after takeoff from a refueling stop. Inspection of the flight log showed no F9F-4 time for more than five months, and no fighter time in that period except for 4.7 hours as second pilot in a TV.

A witness said the pilot appeared nervous during the early part of the flight and had difficulty flying the plane, and that the previous landing had been very poor and rough, blowing both tires on the main gear and running off the runway.

The pilot had been hospitalized six months before for a possible anxiety reaction with digestive discomfort and extreme weakness.

The failure to fly in F9Fs for more than five months could indicate a fear and deliberate avoidance of high-performance aircraft. The rough landing undoubtedly increased apprehension and anxiety.

To the flight surgeon reporting the crash, the most probable cause appears to be an anxiety reaction leading to hyperventilation (overbreathing) and unconsciousness.

Stress Accident

This student pilot was making his seventh pass of an extra time FCLP. At the 90-degree position he

received a come-on, and shortly thereafter a waveoff by radio and paddles. At the same instant the left wing dropped. The pilot did not respond to the waveoff but braced for the crash. The left wing hit, the plane cartwheeled, skidded, and burst into flames. The pilot sustained only minor lacerations.

He admits to much stress and anxiety while flying. This seemed to begin with formation work and was not present to any great degree during the primary stage. Recently while attempting carquals he received six successive waveoffs, becoming progressively more upset and obviously was not able to overcome his anxiety.

The fact that he made no attempt to recover or to obey the LSO during his accident indicates to the flight surgeon that he may be freezing at the controls. He may be generally, or temporarily, unadapted to fly, and was grounded for psychological evaluation of his aeronautical adaptability.

Such a case as this presents an opportunity for the landing signal officer and flight surgeon to work together in accident-preventive medicine.

Aviation safety can be greatly improved by careful inspection of repeated, or single, demonstrations of poor flight performance.

Banshee Unglued

AT AN indicated altitude of 3000 feet, 40-degrees nose down in a rocket firing run, the F2H-4 disintegrated.

The pilot could not raise his hands when he tried to pull the curtain, and was being thrown about violently, partly because he had not re-locked his shoulder harness after releasing it to check circuit breakers. Presumably the plane disintegrated, for the pilot reports that the next thing he knew he was falling through the air, free of the seat. His automatic lap belt apparently had functioned. This probably saved his life, as it is doubtful that he could have pulled it manually in time, especially as his shoulder was dislocated, perhaps due to windblast.

The oxygen mask and APH-5 helmet were torn off, although the chin strap was properly secured; but the nape strap had not yet been installed. He also lost his flight gloves (a size too large the only ones he had been able to obtain.)

He opened his chute manually, but was unable to release the leg straps before entering the water. He encountered difficulty in finding the Mae West toggles because he had tucked them up 'to avoid interference with the lap belt.' He now recommends that this not be done! He was rescued by the plane guard destroyer.

Three months prior to deployment the pilot's entire squadron had gone through survival training and spent a full day on water survival training, including practice at getting out of chutes and into rafts in the water. He feels that since he was somewhat dazed, most of his actions in the water were automatic and a result of the survival training, and that without it, he would have had difficulty using his equipment, or surviving.

Dirt Hurt

A DIRTY windshield was considered a possible contributing cause of the hard carrier landing which cost an F9F-8 its nosewheel.

The pilot noticed the dirty screen when turning into final because he was not able to see the LSO at a distance he feels he normally would have seen him. The flight surgeon feels that the chief detrimental effect was that it resulted in the delay in the time at which the pilot received the LSO's first "comment" on line up and glide path evaluation.

Though the plane captain probably sends his planes off with clean windshields, film is picked up in flight.

It is recommended that all pilots be instructed and urged to notify LSO's of a loss of visibility for any reason, and thereby receive assistance by radio in proportion to the need.

Prescription Sunglasses

A PROTOTYPE study was made in which 120 naval aviators requiring the use of prescription sunglasses while flying were issued sunglasses incorporating their prescriptions. Indications are that these glasses fill a definite need and are most acceptable. Plans are under way for the issue of these glasses to all aviators requiring their use during FY 1959.

WHIZ QUIZ

Answers from page 29

1.	1. Whistle	1000 yds. downwind
	2. Flashlight	two miles
	3. Dye marker	ten miles from 3,000 feet altitude
	4. PRC-17	line of sight—which can be upwards of 50 miles
	5. MK-13 Day, Night signal Flare	five to eight miles
	Smoke	7-15 miles dependent on wind velocity
	6. Mirror	up to 40 miles

2. Severe bleeding and lack of breathing, in that order. Control the bleeding and then give artificial respiration. Artificial respiration will not save the life of a man who is bleeding to death.

3. YOU answer this one. If you don't know, go look!

4. Whoever is assigned this duty in the aviation ditching bill.

5. Maximum of eight pints.

NC-5 OPERATING TIPS

The number of aircraft damaged by NC-5s last year totaled more than four fighter squadrons.

During the past year, operators of NC-5 type vehicles have clobbered over 50 aircraft — the equivalent of four fighter squadrons laid up for repairs! Besides putting this number of airplanes out of commission, two men lost their lives and millions of dollars in damage to Navy property resulted.

What were the major causes of so many accidents? In 75 percent of the reported cases the normal pattern is one of the following:

1. The operator backs up to an aircraft. He engages the generator drive, brings the engine to governed speed (approximately 3000 rpm) and finally releases the clutch, *neglecting* to place the gear in NEUTRAL.

2. The operator backs up to an aircraft and stops the engine. He then engages the generator drive, sets the governor and disembarks to make aircraft connections. After making the connections, he reaches into the vehicle and starts the engine. The transmission is still engaged and a runaway results.

3. The operator's foot slips from the clutch pedal while operating in close proximity to aircraft. In most cases, the transmission is in REVERSE.

4. The operator backs up to an aircraft and engages the generator. Some time after the operator leaves the vehicle, the transmission allegedly jumps into gear. (nearly always reverse)

In the majority of the cases the vehicles involved in the accidents are the Szekely units*.

It is significant that a low number of the vehicles manufactured by *Consolidated Diesel* are involved. This is believed to lie in the extremely positive NEUTRAL position and the very noticeable reverse position of the gear shift lever of these vehicles. See fix recommended by NAS Norfolk for Szekely-built NC-5s.

The other 25 percent were due to just plain driving into aircraft, brake failure, slippery hangar decks . . . Most of these accidents could have been prevented if the operator had been just a bit more careful and alert.

BuAer is currently evaluating several fixes so drivers can't energize the generator when the NC-5 is in DRIVE GEAR (see illustrations pages 40 and 41). Until your machine is modified, here are a few precautions. Follow these and help the NC-5 accident rate drop.

- Always park the NC-5 parallel with the aircraft —don't point.
- Spend a few extra seconds checking the NEUTRAL gear position.
- Reel out a little more of that power cord— Don't operate your NC-5 too close to the aircraft.

(Continued)

FOR SZEKELY MODEL NC-5—. . . a locking bar connected to the shift lever, devised by Fasron 112, permits engagement only when the cranks of transmission are aligned in NEUTRAL position.

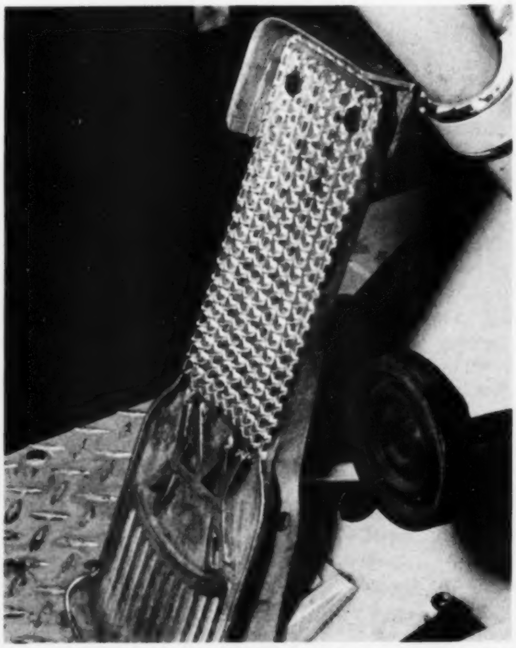
FOR SZEKELY—NAS Norfolk fix employs a NEUTRAL position indicator (inset) and Bowden wire arrangement (below).

To assist in the evaluation of several interlocking safety devices for NC-5s, BuAer has authorized operating activities to manufacture and install devices of their choice. It is BuAer's intention to determine the most effective types and to disseminate information for adoption. For additional information and drawings concerning those illustrated here write BuAer, Attn: SE 746.

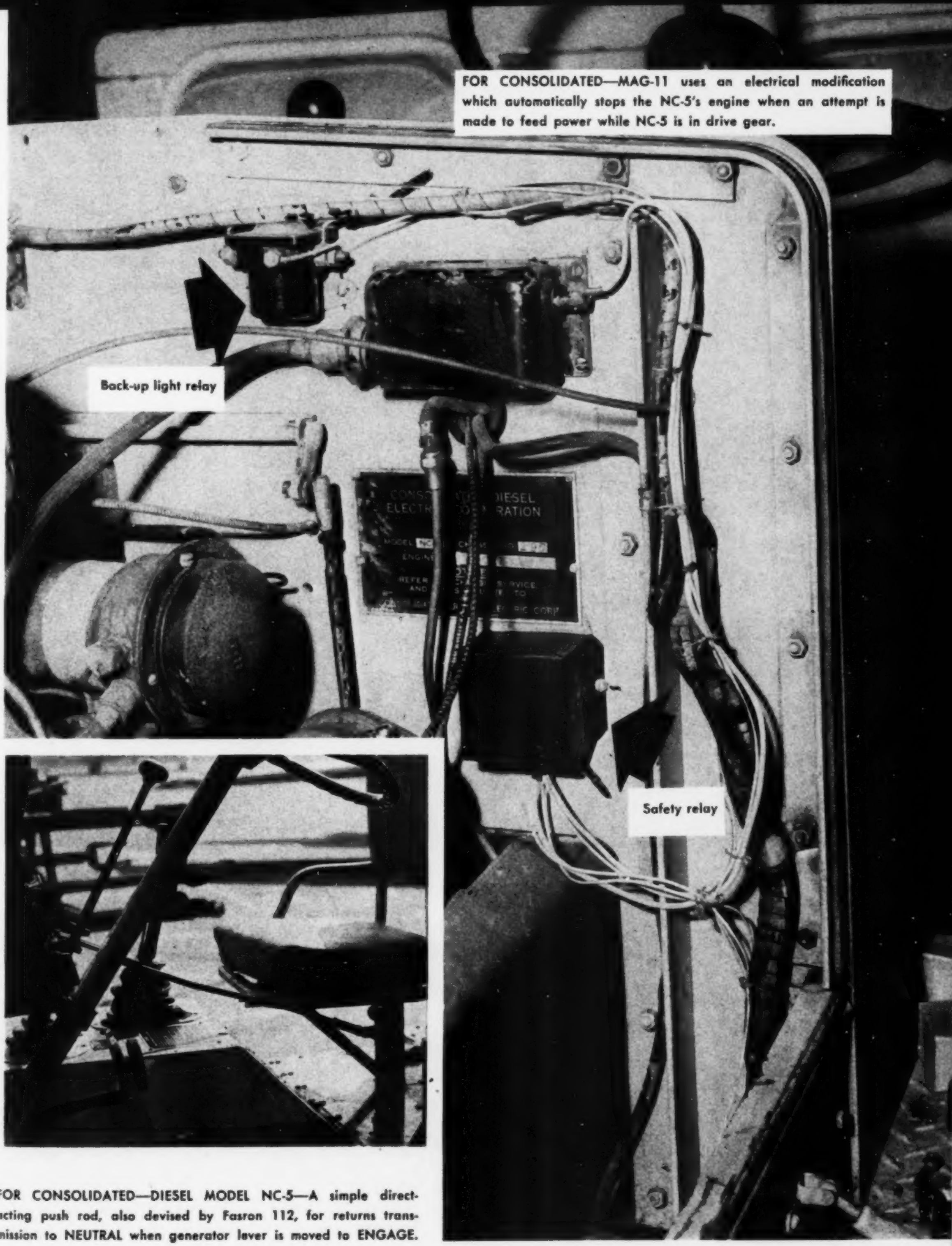
- Set the hand brake and place chocks under the rear wheels.
- When you engage the power generator, release the clutch before you pull out the throttle.
- Know your NC-5 and the operating procedures.
- Don't exceed speed limits and always drive slowly when near aircraft.
- Don't try to squeeze between aircraft. When in doubt take an extra minute and be sure.
- Use "wing walk" paint on NC-5 clutch pedals to prevent slippage—or modify the pedal as shown.

The adoption of these techniques and/or fixes should certainly pay off in fewer accidents.

* For further information, see BuAer Instr. 11240.26, ComNavAirLant Instr. 11240.1, and CNaTra Notice 11240—Ed.



FOR CONSOLIDATED OR SZEKELY—H&MS-11 has developed this NC-5 clutch pedal which prevents the operator's foot from slipping off. The cross-hatch grooves are milled. The lip is formed around the top, attached with two bolts and welded.



FOR CONSOLIDATED—MAG-11 uses an electrical modification which automatically stops the NC-5's engine when an attempt is made to feed power while NC-5 is in drive gear.

FOR CONSOLIDATED—DIESEL MODEL NC-5—A simple direct-acting push rod, also devised by Fasron 112, for returns transmission to NEUTRAL when generator lever is moved to ENGAGE.

FROM THE GROUND UP

Selected Forced Landings,

Incidents,

Ground Accidents,

Notes and Comments on

Aircraft Accidents

FUR USAGE — Activities using liquid oxygen systems should make better use of the FUR system in reporting failures of the quantity or gaging system The importance of the liquid oxygen quantity system ranks with that of the fuel quantity system and this should not be overlooked. Unchecked failure trends in this system might easily lead to the loss of expensive aircraft and even more valuable highly trained pilots and crewmen.

Activities using liquid oxygen have few, if any, instructions on the maintenance of the quantity

system. No NavAer or AN publications are available on the operation and maintenance of Liquid Oxygen quantity systems. Some aircraft handbooks of maintenance instructions, such as the F8U, contain quite detailed instructions on the Liquid Oxygen system; while other handbooks, such as the A3D, contain little or no instructions on the liquid oxygen system.

Present policy puts the responsibility for the installation of the transmitter probe with the Aviation Equipment Division and the responsibility for the indicator and the wiring with the electrical division, neither division being fully aware of the principles of operation and maintenance of the system, nor its importance to flight safety. The practice of filling the liquid oxygen converter prior to flight has over-shadowed the importance of the quantity system, since it is assumed that the full converter will exceed the expected flight time which is limited by the maximum fuel supply. With future possible installations of bomb-bay fuel tanks, possible advance to in-flight refueling, or in the advent of a leaky liquid oxygen system, the flight time may well exceed the oxygen supply. In such cases, the liquid oxygen quantity indication may be as vital to crew members as is the fuel quantity indication.

In the above failures, it was suspected that extreme vibration and shock had contributed to the failure of the transmitter parts, such as the wire breaking in unit No. 233. However, there are not enough reports or evidence of similar failures to substantiate this and more investigation should be made before valid conclusions may be drawn. This information might be obtained from the Navy's designated overhaul points, Norfolk and Alameda, and from Bendix Aviation, where these units are repaired for Douglas. Steps should be taken toward preventing a continuation of such a failure trend, if only for economic reasons, for ASO lists the transmitter unit cost as $500 and the indicator unit cost as $100 each.

A number of recent mil-specs now describe the design and construction of liquid oxygen systems and quantity gages. It is probable that more recently manufactured systems will be more reliable if built to Mil-G-19053B which states in part "the gaging system shall be a null-balancing, three wire, capacitance type bridge—The probe of the liquid oxygen converter shall be the measuring capacity of the capacitance bridge system—any electronic circuits required for amplification and power supply shall be part of the indicator — The gaging system shall be designed in all cases to operate without field adjustments — Vacuum tubes shall not be used in the electronic circuit of the gage—Variation in the length of the lead wires between the probe and indicator shall not affect gage system accuracy."

DECK CHECK—The FJ-3M made a normal mirror approach. On touchdown, the hookpoint struck the aft anchor plate of the center wire support elevator installation at the No. 1 arresting wire, then partially engaged the No. 3 wire, which was pulled out 10½ feet. The hookpoint toe was partially sheared by the anchor plate, and was carried away by the No. 3 wire. After decelerating 10 knots, the aircraft bolted and made a normal landing on the second approach.

This near-accident was a result of the improperly secured aft anchor plate of the center wire support elevator installation at the No. 1 wire. Only the two forward securing screws were installed. With the two aft screws missing, the aft edge of the anchor plate protruded above the level of flight deck approximately ⅜-inch, allowing the hookpoint to strike it.

It was recommended to the ship's air department that a more thorough maintenance program be conducted by the arresting gear crew.

DECK CHECK No. 2—An F9F-8P was being moved on hangar deck when the starboard wheel struck the abrupt edge of a hatch cover. Backward momentum of the aircraft lifted the nosewheel off deck and caused the aircraft to pivot counter-clockwise on its starboard gear and the starboard stabilizer tip to strike roller-curtain stancheon. Starboard stabilizer tip was crushed necessitating replacement.

The carrier modified the edge of the hatch in order that aircraft can be pushed safely over the hatch.

Loose plate damaged hookpoint, left, causing aircraft to bolt.

DID JUST WHAT THEY SAID IT WOULD—A qualified ordnanceman was indoctrinating a BuAer representative in TV-2 ejection seat procedures. He pointed to the armrest and explained that when the armrest is raised the canopy will be jettisoned. The civilian raised the armrest and the initiators fired.

Improper installation of the ground safety pin below the armrest handle allowed the upward movement of the armrest which was of sufficient force to fire two M-3 initiators, even though the safety pins were properly installed in them. Fortunately, there were no injuries.

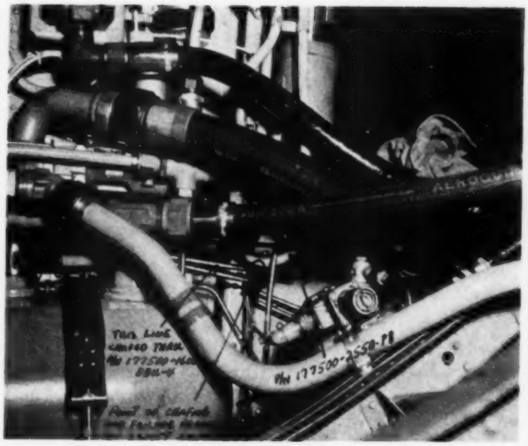
The reporting unit stated that all personnel concerned with ejection seat check-outs have been directed to precede the check-out with a period of study of the appropriate Erection & Maintenance Manual and Pilots' Handbook. Further, all personnel concerned with the on-the-ground safety pins have been instructed concerning the *proper installation of all safety pins in each model aircraft on board.*

HOTSPOTS—When you put a pencil mark on an exhaust system component—you have really "marked" it for failure.

If it's in an area that gets good and hot—and that's practically all over—the carbon of the pencil lead (graphite, practically pure carbon) is absorbed by the material, which makes a localized spot of high carbon steel extra brittle. Then expansion, contraction and vibration cause it to crack. The crack is not confined to the dimension of the original pencil mark; it keeps right on going. This applies to jet compressor blades, reciprocating engine exhaust stacks and manifolds as well.

So you see a very innocent little deposit of any free carbon on a "hot spot" can start a very insidious chain of events.

F9F-ers HAVE A LOOK-SEE — Dive flaps up-line part no. 177500-1600-DBU-4 chafed through resulting in loss of hydraulic pressure and fumes in cockpit. Chafing occurred at the point where line 177500-1600-DBU-4 passed under hydraulic line 177500-2550-P8 which was also chafed approximately 80 percent of wall thickness. Inspection



of four other F9F-8T aircraft revealed similar conditions on two of them.

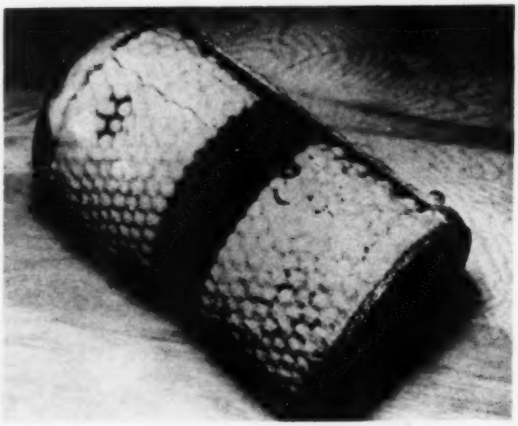
Further inspection of all lines located in the plenum chamber of all these aircraft revealed additional chafing due to installation, improper spacing, or radius bend.

SHORT CIRCUIT—The airframe of an FJ-4 was overstressed due to excessive G forces.

Investigation revealed that a $\frac{5}{16}$ inch aluminum washer was found lodged between the terminal post B^1 and X^1 of the flaps control relay, Part No. 9244. These terminal posts supply power to the down side of the flap actuators. The washer completed the flaps down circuit causing them to lower without the flap actuator handle being moved.

The pilot, while in a hard starboard turn, experienced a sudden increase in G load on his aircraft. The pilot pushed forward stick and leveled his wings to relieve the G forces. After recovery, an inspection of the instruments revealed that the *flaps* were in the DOWN position *while the flap handle* was in the UP position. The accelerometer indicated that 8.4 positive G and 2 negative G had been registered on the aircraft.

FUEL ICING—Ice or dirt-clogged fuel filters and lines can cause jet engine flameout. All aircraft fuels contain a certain amount of dissolved or entrained water, and concentration of this water varies in accord with temperature of the fuel and percentage of aromatics it contains. Because JP-4 jet fuel has a rather high percentage of aromatics it can contain a greater than average amount of water. This factor can cause in-flight engine failure and possible aircraft accidents if



This particular 10 micron filter was operated by Lockheed under conditions of 1900 pph fuel flow with a fuel temperature of —10F (—23°C) to show the effects of icing. After 54 minutes of operation the filter accumulated sufficient ice from water contaminated fuel to increase the pressure drop across the filter element to the point where the bypass valve was actuated. In the case described, only four ounces of water in 1000 gallons.

preventive measures are not taken during ground servicing.

Although warm fuel will retain dissolved water in suspension, its ability to entrain the moisture decreases as fuel temperature drops. Then, water tends to settle to the bottom of storage tanks or aircraft fuel cells. Water can enter aircraft fuel systems as a result of improper ground servicing and fuel storage. Open aircraft fuel caps also can cause this trouble and condensation within the aircraft fuel system is another contributing factor. Entrained water will not necessarily freeze even at temperatures as low as —60°F., but particles of dust and metal also suspended in the fuel can turn entrained moisture into minute pieces of ice. If dirt in a fuel system collects around a filter element, it can cause freezing of water accumulated at the same element. Then ice gradually shuts off the flow of fuel to the engine.

It is essential that ground servicing and fuel storage facilities be clean and free of moisture. This equipment should be inspected periodically and without fail whenever local aircraft encounter icing problems. Aircraft fuel tank sumps and plumbing should be purged daily. Fuel tank sumps of aircraft kept in warm hangars should be drained when aircraft are moved outside. The alcohol anti-icing tank must be filled with ethyl alcohol during each preflight aircraft check. These procedures, if properly performed, will minimize winter fuel icing difficulties—*AF "TIG BRIEFS."* For more on fuel contamination see ' issue and "Flameout," April '58.

GARBAGE CAN?—An FJ-3 pilot following a catapult shot found himself in a left bank and with a control stick which would not move to the right. The pilot kept the flight under control by using the rudder to level the wings. At altitude, a little violent exercise with the stick brought back normal control operation, and the flight continued successfully.

Return to the deck naturally ended up in a search for the cause of the jammed stick. Eventually, a hoisting fitting plug (Part No. 181-31511-11) was found under the aft end of the aileron control rod subassembly (Part No. 181-52303-5). This plug was just the right size to fit under the rod end and jam it to prevent movement.

It was believed that in some way the plug had dropped down through one of the control bellcrank openings as the space between the console closeouts and cockpit floorboards was not wide enough to pass the hoisting plug. Repeated catapult launches are thought to have eventually worked the plug into a jammed position.

At the time, due to the circumstances, the problem was considered an isolated case and forgotten until another jammed aileron control was reported. This instance was taken as the signal to search all the squadron's aircraft in the area below the cockpit floorboards. The results were as revealing as the small print in an insurance policy.

Besides the miscellaneous nuts and bolts found in nearly all of their aircraft, the junk consisted of *eight hoisting fitting plugs, a plastic handled screwdriver* (which jammed the skipper's controls), *five hose clamps, four fuse and fuse holder combinations, a ½" socket set extension handle, a fingernail clipper, a pencil, three ground safety pins and flags, a 6" steel Mae West deflater, a sheet metal scribe, various parachute and Mae West straps, a wire guard from the external stores release handle, a hydraulic line dirt plug, a light bulb, an eyeglass bow and various small trash, such as gum wrappers . . .*

The squadron involved is making an inspection of the area under the floor boards at each 60-hour inspection from now on and has recommended to BuAer that the inspection be made mandatory for all FJ-3 activities.

It is believed hoisting plugs are being placed in the seat when aircraft is being hoisted aboard and possibly kicked to the floor to find their way into the area below the floor boards.

It is possible that trash in the control rod area might have had a bearing on some of the unexplained strikes which have followed catapulting.

High pressure and low pressure outlets being side by side tends to increase the possibility of error.

AIR COMPRESSOR MAINTENANCE—The recent failure of a model P-3310-G, Ingersoll-Rand air compressor was caused by an internal explosion. BuAer recommends compressor valves be inspected and cleaned every 100 hours.

Heavy caked carbon deposits appearing on the valve spring or other internal parts is an indication of excessive oil being introduced into the compressed air. If the cause cannot be corrected locally, the unit should be returned for overhaul.

If oil deposits are found in the air passages the unit is unserviceable. A small quantity of oil will ordinarily be found in the intercooler sump. This is not abnormal, but the quantity of oil should not exceed 2 or 3 tablespoonsful. If excessive oil is found the unit shall be returned for overhaul if it cannot be corrected locally.

NOTE: BuAer is initiating action to obtain revised and up-to-date handbooks concerning air compressor operation and maintenance.

OVERINFLATED STRUT — After takeoff and while actuating the landing gear handle, the A4D pilot heard several loud thumps and bangs. The only abnormal indication that the pilot had in the cockpit was a nose gear "barber pole" on the wheels and flaps position indicator.

The pilot of the assisting aircraft joined up in flight and observed that the nosewheel was partially retracted with the wheel resting on the fuselage just forward of the nosewheel well. In addition, a piece of fuselage skin inboard of the port gun was hanging down.

After the landing gear was placed in the down position the nose gear indicated unsafe. The pilot accelerated to 220 knots and pulled positive G's, at which time a down and locked indication appeared A landing was made utilizing the field emergency arresting gear.

The aircraft sustained substantial damage when the bulkhead to which the telescoping mechanism attaching fitting Part No. 3446124 is attached was

torn loose from the aircraft structure, carrying with it a portion of the skin and attaching longerons aft of the nosewheel well on the port side. The fitting Part No. 544496-3 LH was pulled out of line about six inches and broken in the center.

From the investigation of the accident it was determined that the nosewheel strut had been improperly inflated to 650 PSI. With the nose strut inflated to 650 PSI the telescoping mechanism was unable to compress the shock strut, resulting in failure of the supporting structure to which the telescoping mechanism is attached.

Mechs responsible for inflating the nose landing gear strut should adhere to the placarded instructions attached to the strut.

HIGH PRESSURE AIR—Two mechanics were inflating the port tire of an A4D-1. One was gauging the air pressure to the tire, the other was tending the compressor. The tire ruptured with explosive force, injuring one mechanic and causing damage to tire, wheel and underside of the wing.

The accident was caused by use of high pressure air to inflate the tire. An Ingersoll-Rand portable gasoline-driven compressor was being used.

Due to the physical location of the compressor outlet manifolds (the high pressure and low pressure manifold outlets are side by side) increases the possibility of error.

Recommendations: Paint the ends of the two hoses different colors so that the man actually attaching the hose will be able to determine that proper air supply is being used.

PROPER LANDING GEAR TIRE PRESSURE — Tires of high performance jet aircraft are built to take the considerable punishment inflicted by the weight and high runway speed of today's fighters, bombers and tankers. However, these tires require proper maintenance for safe, economical operation. Inadequate tire pressure, for example, can result in an aircraft accident. This happened recently in one major command when an improperly inflated nose gear tire caused the complete loss of one aircraft. Failure to perform such minor, routine maintenance can be a tragic, costly oversight.

Maintenance supervisors should assure that persons concerned understand the importance of checking aircraft tire pressure frequently. Mechanics and servicing personnel should have accurate tire pressure gauges. Too much pressure can be as dangerous as too little. Aircraft technician and mechanic kits should contain a tire gauge. If not, early action should be taken to requisition authorized gauges.

WHEEL SAVES SAVE MORE THAN WHEELS

A wheel save is worth its weight in airplanes. You might get away lucky and ring up a tab for just a few thousand dollars, but even that bill doesn't include the flying hours denied your squadron while it's being fixed—they're gone forever. Or you might hit the jackpot and wipe out an airplane for keeps . . . . . isn't it worth a walk out to the wheel watch to shake his hand after he's waved you off from a belly-scraper?

Sure, he was just doing his job—but YOUR job requires you to land with the *wheels down*. . . .

Wheel Watch	Station	Aircraft	Date
PFC A. SAVASTANO, USMC	MCAS Miami	AD-6	12-2-57
PFC J. B. KEARNEY, USMC	MCAS Miami	FJ-3	12-18-57
PFC W. A. CONNOLLY, USMC	MCAS Miami	AD-5	1-15-58
PFC J. H. PULLIAM, USMC	MCAF Navy No. 955	AD-4	1-19-58
ROOT, B. M., ACTAN(W)	NAS Alameda	FJ-3	2-2-58
LT J. D. COHOON, USNR PFC P. E. POCIUS, USMC	MCAS Miami	F9F-6	2-11-58
LTJG W. F. DOODY	NAS Cecil	A4D-1	2-17-58
PFC K. G. AUBE, USMC	VMA-324	AD-6	2-17-58
P. R. SAUNIER, ACT3 H. M. O'DELL, AC1	NAS Oceana	F9F	2-5-58
LCDR J. T. CLEGHORN C. S. NETHERLAND, ADR3 W. J. FALGOUT, AC3	NAS New Orleans		1-25-58

BOX SCORE

Wheels-up landing, unintentional, pilot induced

March 1957 4

March 1958 0

TIP TANK

MISCELLANEOUS AVIATION SAFETY TIPS . . .

IFR Radio Failure

A RECENT change in the Supplementary Flight Information Document (SFID) expands and explains in detail the procedures to follow when experiencing two-way radio failure while on an IFR flight plan. Are you familiar with it?

Air Facts

"EACH knot of excess airspeed on final is equivalent to approximately ten feet of excess altitude . . ."—*"Air Facts"*

CAA Instrument Let-downs

DURING the 1957 fiscal year, the CAA employed some 10,800 men and women to operate 93,000 miles of airways. During this period, the number of instrument approaches increased 47%, from 712,000 to 1,049,000. The CAA Air Route Traffic Control Centers reporting the most instrument approaches were: New York with 82,012, Atlanta with 72,895 and Los Angeles with 70,416.—*U. S. Aviation Insurance News Bulletin*

Plan Ahead—Ed.

Please Refrain

THE AF reports that during a takeoff run following a series of full stop landings, the passenger inquired about fuel remaining. At this moment the pilot of the TV type aircraft was about to adjust flaps. Unfortunately he retracted the gear.

While the pilot goofed, and failed to follow squadron doctrine, the other point pertains to passengers. In many public conveyances there is displayed a sign instructing the passengers to refrain from talking to the driver while the vehicle is in motion. We think the pilot of a jet aircraft should be accorded the same consideration. The passenger certainly wasn't trying to cause an accident when he made his query concerning fuel remaining BUT, during takeoff or landing is no time to be making small talk with the pilot.

Mid-Air Rule

IF THE bearing of the aircraft (or lights) changes, you are O.K. If the bearing does not change, you had better take immediate action.—*MAG Two Dope Sheet*

Chopper Report

DURING fiscal 1957 Navy helicopter operations there were 20 autorotation accidents, of which 11 were emergency autorotations. In the same period 27 autorotations were made without accident damage following engine failure.

Of the nine practice autorotations which resulted in aircraft damage six resulted from improper recovery technique and a hard landing caused the necessity for an accident report. (For further information and recommendations safety officers may refer to "Crossfeed," 1 Feb, Helicopter Analyst's report).

Pilots Take Special Notice:

DID *you* see the *Demon* stall in the hot break the other day? He ended up in AB at 200' over the shipyard before he got it under control again. Since you have no AB, just recall that at the break at 250 knots, you can pull 4½ G before stalling *in level flight*. In a wrapped up bank, you can take only about 60 percent of this. . . . The sweptwing is a widow maker unless *you* handle it like a pro from start to finish and the flight isn't over until you're in the chocks.—*Fly Sheet*

The THUNDERSTORM is one of nature's most spectacular displays of power, exceeded only in concentrated force by the tornado. A recent estimate indicates that a single air mass thunderstorm releases energy exceeding that of 10 atomic bombs. In the case of the thunderstorm of course, the energy is released over a period of about an hour rather than in one instantaneous burst.

MURPHY'S LAW*

*If an aircraft part can be installed incorrectly, someone will install it that way!

After completing a preflight inspection and performing preflight cockpit checks preparatory to test flight, the pilot of an FJ-3M recently out of O&R began his takeoff run. The aircraft lifted into the air after about 5000 feet gear was retracted and the aircraft pitched up and to the left. At an altitude of 50 feet the plane rolled off to the right. Flaps were retracted and the aircraft was forced onto the runway in a right wing-down attitude. It struck the runway with the right wing and right wing fuel tank coming to rest 2165 feet from touchdown point. While the pilot escaped uninjured the aircraft received overhaul damage.

A functional check was made of the aircraft control system utilizing an external power source and a hydraulic mule. This check established the following:

a. When the control stick was moved toward the right side of the cockpit, *both* ailerons moved to the UP position.

b. When the control stick was moved toward the right side of the cockpit *both* ailerons moved to the DOWN position.

It was recommendea that:

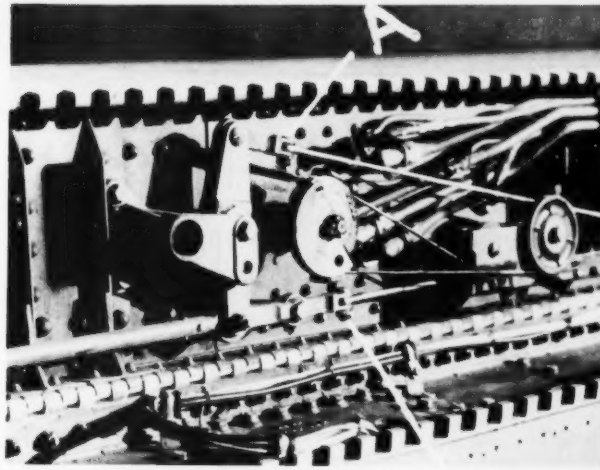
(1) in addition to the standard aileron travel check, control stick position *vs* aileron position be added to each intermediate and all major check sheets; this check to be made also after replacement of a control or component. Note: *Hydraulic and other boost control aids cannot be checked by preflight personnel without engine run-up or auxiliary sources.*

(2) Pilot aids in the form of a mirror be installed to observe operations of the control surfaces of swept-wing craft since the position of control surfaces are not in the most favorable position to be observed from the cockpit.

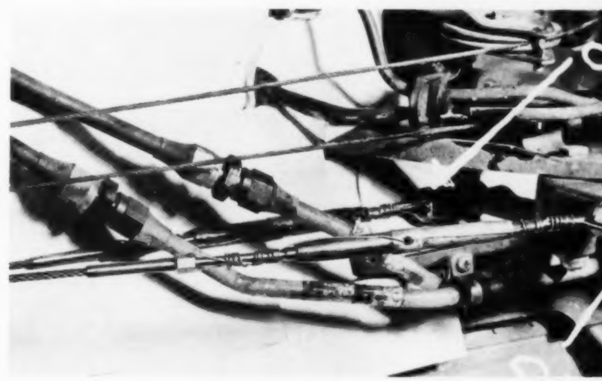
Reviewing authorities noted that it is almost incredible that the aircraft reached the runway without the aileron discrepancy being detected, noting further that it was not able to determine that O&R incorrectly routed the control cables because the squadron had physical possession of the aircraft for approximately two months prior to the accident and did have ample opportunity for dropping the leading edge of the wing and possible rerouting the cables. Therefore, it is possible that Murphy's Law came into effect at one or both levels.

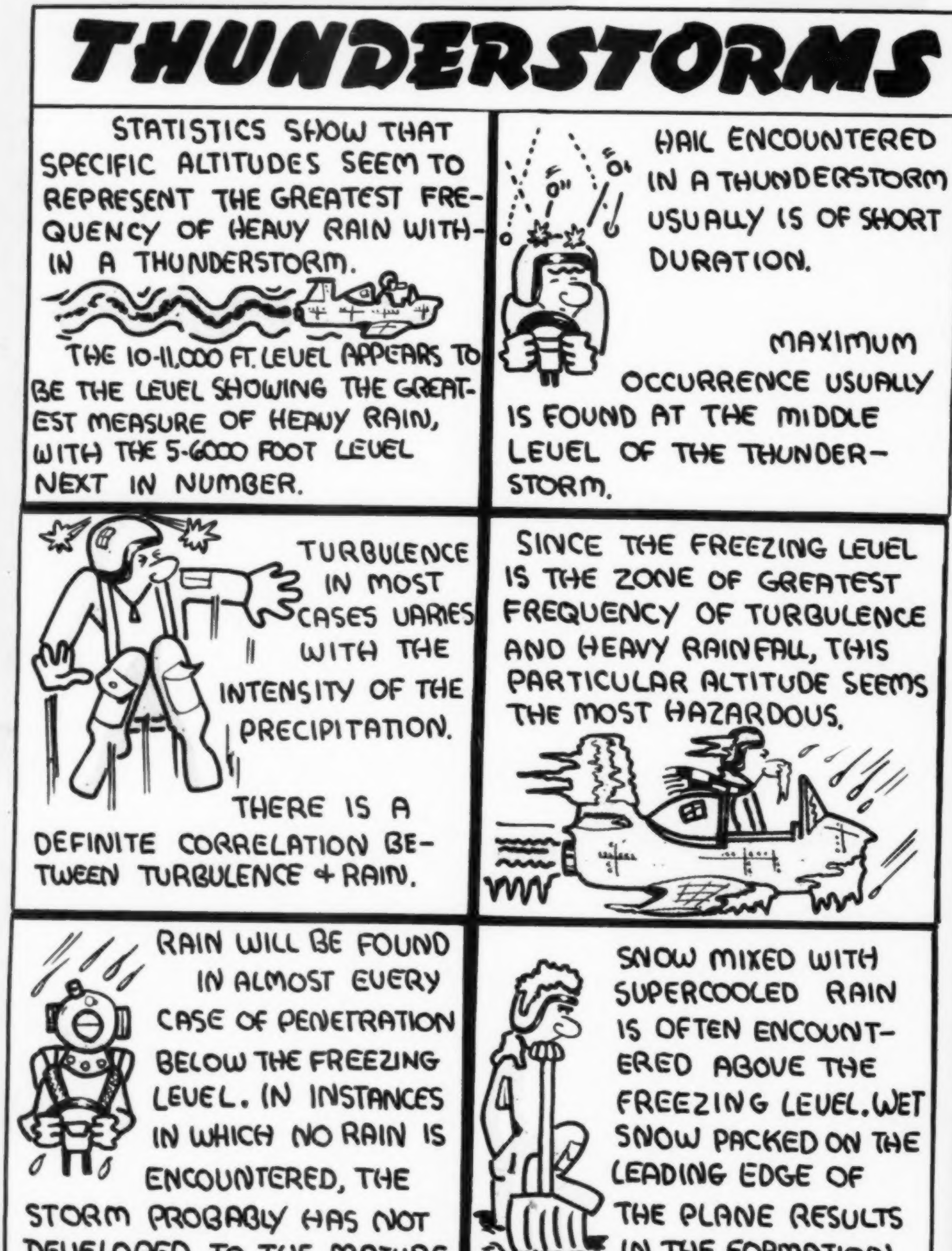
For example, a similar incident occurred about 20 years ago when aileron cables were crossed in an NJ-1 during a wing change and went undetected until the test flight which followed. How is it possible for a design error discovered 20 years ago to be built into a modern airplane?

Always make a visual check of the system involved. Should a Murphy's Law situation be discovered—make out a FUR and get it into the mails immediately.



Aileron control cable attached to the inboard bellcrank fitting at point D was connected to outboard bellcrank fitting at point B instead of point A, and cable attached to point C was connected to point A instead of point B. Crossing of aileron control cables thusly resulted in both ailerons moving UP when the control stick was moved left and DOWN with movement to the right.




THUNDERSTORMS
STATISTICS SHOW THAT SPECIFIC ALTITUDES SEEM TO REPRESENT THE GREATEST FREQUENCY OF HEAVY RAIN WITHIN A THUNDERSTORM.
THE 10-11,000 FT. LEVEL APPEARS TO BE THE LEVEL SHOWING THE GREATEST MEASURE OF HEAVY RAIN, WITH THE 5-6000 FOOT LEVEL NEXT IN NUMBER.
HAIL ENCOUNTERED IN A THUNDERSTORM USUALLY IS OF SHORT DURATION.
MAXIMUM OCCURRENCE USUALLY IS FOUND AT THE MIDDLE LEVEL OF THE THUNDERSTORM.
TURBULENCE IN MOST CASES VARIES WITH THE INTENSITY OF THE PRECIPITATION.
THERE IS A DEFINITE CORRELATION BETWEEN TURBULENCE & RAIN.
SINCE THE FREEZING LEVEL IS THE ZONE OF GREATEST FREQUENCY OF TURBULENCE AND HEAVY RAINFALL, THIS PARTICULAR ALTITUDE SEEMS THE MOST HAZARDOUS.
RAIN WILL BE FOUND IN ALMOST EVERY CASE OF PENETRATION BELOW THE FREEZING LEVEL. IN INSTANCES IN WHICH NO RAIN IS ENCOUNTERED, THE STORM PROBABLY HAS NOT DEVELOPED TO THE MATURE STAGE
SNOW MIXED WITH SUPERCOOLED RAIN IS OFTEN ENCOUNTERED ABOVE THE FREEZING LEVEL. WET SNOW PACKED ON THE LEADING EDGE OF THE PLANE RESULTS IN THE FORMATION OF RIME ICE.
O'Connor